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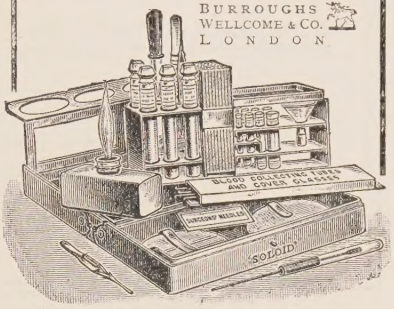

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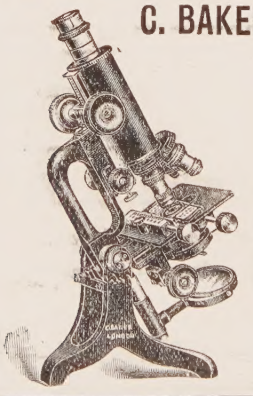

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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 4.] 1914. [No. 5.

RELAPSING FEVER.

COSKINAS (Georges S.). **Fièvre récurrente et Syndrome méningé (Epidémie de Fièvre récurrente en Grèce pendant et après les deux Guerres de 1912-1913.)**—*Bulls. et Mém. Soc. Méd. des Hôpit. de Paris.* 1914. May 7. 3 sér. Vol. 30. No. 15. pp. 772-780.

The author was attached to a hospital in Salonica during the Balkan war, and observed numerous cases of relapsing fever amongst the troops. In the military hospitals of the first line there were many cases of the infection being transmitted to medical attendants and nurses, as it was impossible to free the patients from lice and, in the Section directed by the author, out of 200 patients 30 became infected with relapsing fever.

This disease was first observed in soldiers that had been in contact with Turkish prisoners, and there can be no doubt that the relapsing fever that occurred in the Greek army was originally introduced by the Turks.

The author then gives an account of the clinical symptoms of the disease as observed in about 17 per cent. of the cases in Salonica and also at Athens. The syndrome consisted in the presence of Kernig's sign, stiffness of the neck and other muscles of the body, hyperaesthesia and troubles of the intellectual faculties, the combined symptoms having a decided meningeal aspect. These symptoms were so marked in certain patients that occasionally cases of relapsing fever at first were mistaken for cases of cerebro-spinal meningitis. The cerebro-spinal fluid of the patients was examined in most of the cases and was always found to be clear, though there was a slight increase in the albumin content.

This meningeal syndrome may appear in the relapses as well as the first attack, but is more frequent in the latter; the prognosis of the disease is not affected by the presence of such symptoms.

In several patients the quantity of urobilin in the liver was enormous, and three patients showed the presence of this substance in the urine, without pigment or biliary salts, but the author at present is unable to decide as to its significance. The article is accompanied by detailed clinical descriptions of eight patients who presented meningeal symptoms.

E. Hindle.

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Lafforgue. **Le Syndrome méningé dans la Fièvre Récurrente. Polymorphisme symptomatique de cette Maladie.**—*Bulls. et Méms. Soc. Méd. des Hôpit. de Paris.* 1914. May 21. 3 sér. Vol. 30. No. 17. pp. 883-887.

After referring to the observations of Coskinas (see above) regarding the frequency with which meningeal symptoms sometimes occur in cases of relapsing fever, Lafforgue describes the history of one or two patients who showed similar symptoms in Tunis. Moreover, he insists upon the presence of urobilinuria in cases of relapsing fever, and although the diminution in globular resistance may accentuate this phenomenon, the lesions of the liver and especially of the bile ducts are considered sufficient to explain its occurrence.

E.H.

Ardin-Delteil, Raynaud (M.), Coudray & Derrieu. i. **Syndrome Méningé dans la Fièvre Récurrente Nord-Africaine.**—*Bulls. et Méms. Soc. Méd. des Hôpit. de Paris.* 1914. June 25. 3 sér. Vol. 30. No. 22. pp. 1126–1149. With 15 charts.

ii. **Note sur les Réactions cytologiques observées dans le Liquide Céphalo-Rachidien de Malades atteints de Fièvre Récurrente Nord-Africaine.**—*Ibid*, pp. 1149-1153.

i. As a general rule relapsing fever is rarely associated with any nervous symptoms. The patient preserves his intelligence, and can speak and answer questions correctly, this mental lucidity being in marked contrast with the high temperature and the intensity of the general symptoms. In a certain number of cases, however, distinct nervous symptoms are present and one or two authors have called attention to this fact [see above]. The authors observed 41 cases of relapsing fever during a recent epidemic in Algeria, and in sixteen of them well marked meningeal symptoms were present. Detailed descriptions, accompanied with charts, are given of fifteen of these cases, from which it appears that the nervous symptoms are mainly present during the initial attack of the disease. Lumbar puncture was practised on the majority of the patients, and in all cases the fluid was clear, though the albumin content was augmented. In no case could any spirochaetes be detected. Moreover, two attempts to infect human subjects—one by injecting 3 cc. of cerebro-spinal fluid into the pleura, and the other 2 cc. into the subarachnoidal cavity—gave negative results. In both cases the fluid was collected from patients whose blood contained numerous spirochaetes. In a few of the patients jaundice appeared concurrently with the meningeal symptoms; in three cases it was only manifested by a slight colouration of the conjunctiva, but in two cases typical jaundice was present.

In conclusion the authors state that the appearance of meningeal symptoms during an attack of relapsing fever is not so rare as is generally believed. Although slight in some cases, in others these symptoms may be so well-marked that the clinical aspect of the patients may resemble cases of cerebro-spinal meningitis.

[This is the most complete account hitherto published of the meningeal type of relapsing fever, and as this form of the disease seems to be comparatively common in North Africa, the present paper constitutes a very desirable addition to the literature on the subject.]

ii. Lumbar puncture was practised on 33 patients and in every case the fluid obtained was characterised by the presence of a marked lymphocytosis associated with a mononucleosis. This change is constantly present in the cerebro-spinal fluid of patients infected with relapsing fever and may be observed during the febrile attacks as well as in the apyretic intervals. It persists as long as the infection is in the body and its disappearance is a sure sign of recovery.

These conclusions are in opposition to those of Coskinas and Lafforgue (see above), but the differences may be explained, as the present authors used an improved technique in examining the fluid.

E. H.

Job (E.) & Salvat (J.). **La Fièvre Récurrente à Casablanca.**—*Bulls. et Mém. Soc. Méd. des Hôpit. de Paris.* 1914. July 23. 3e sér. Vol. 30. No. 26. pp. 159-164.

Between May 1913, and June 1914, the authors observed 51 cases of relapsing fever at Casablanca (Morocco). The spirochaete (*S. berbera*) responsible for the disease is transmitted by lice, which explains the fact that epidemics of relapsing fever accompany outbreaks of typhus.

In more than two-thirds of the cases, two attacks were observed. The most frequent complications were affections of the liver and, when this organ was not in a healthy state prior to the infection, the disease tended to be serious. Meningeal symptoms were observed in a single patient only.

The authors treated a few of the patients with injections of organic arsenic compounds and obtained satisfactory results with neosalvarsan administered in doses of about 0·01 per kilogram body-weight.

Particulars are given of a few of the cases, including the only one that was fatal, viz., that of a patient who had previously suffered from syphilis and whose liver was affected in consequence. E. H.

Billet (A.) & Grenier (M.). **Sur la Fièvre Récurrente au Maroc oriental. (Note préliminaire.)**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 382-384.

The authors record the presence of relapsing fever at various stations along the region of Morocco bordering on Algeria. In all 72 cases were observed, of which 20 occurred in Europeans and 52 in natives. The epidemic was very benign and not a single death occurred.

The infection seemed to be carried by the native porters, who probably spread the disease from one station to the next. In all places where epidemics occurred numerous ectoparasites were present.

One of the workers in the hospital was infected in the following manner. Whilst a rabbit was being inoculated with some infected blood a few drops of the liquid squirted up into the face of the operator without, however, any of it touching either his eyes or lips. Although

he disinfected himself immediately, 10 days later he suffered from an attack of relapsing fever. This observation shows, the authors believe, that the spirochaetes are capable of passing through the skin, as well as mucous membranes.

The incubation period was generally 8 to 10 days, but was only 4 days in the case of a man who was injected subcutaneously with a few drops of infected blood. This subject only presented one attack, whilst the general number of attacks was two, and once three.

The parasite is considered to be *Spirochaeta berbera*, Sergent and Foley.

For treatment, the administration of neosalvarsan or galyl gave excellent results. But the disappearance of the spirochaetes was never complete before the expiration of 12, 15, or 24 hours after the injection.

E. H.

Brault (J.) & Montpellier (J.). **Quelques Recherches Hématologiques au Cours de la Fièvre Récurrente Nord-Africaine.**—*Gaz. des Hôpit. Civils et Militaires.* 1914. July 2. Vol. 87. No. 75. pp. 1237-1241.

The authors have made a systematic examination of the blood of twenty patients infected with relapsing fever in Algeria and give the haematological formula and globular resistance of twelve cases. The results show that in spite of the distinct increase in the number of polymorphonuclears a haematological examination is of little assistance in diagnosing the infection. The globular resistance seemed to be affected only in those patients that had previously suffered form malaria.

E. H.

Brault (J.) & Montpellier (J.). **Note sur la Présence du Spirille de la Fièvre Récurrente Nord-Africaine, dans quelques Liquides et Excréta de l'Economie.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 472-473.

The authors have examined numerous cases of relapsing fever at the hospital of Alger-Mustapha and succeeded in finding spirochaetes in the cerebro-spinal fluid of two out of twenty cases. For examination the liquid was centrifuged and then stained with various substances, the most satisfactory results being obtained with the "Tribondeau" method. In one of the patients the spirochaetes were relatively abundant in the cerebro-spinal fluid, but nevertheless no meningeal symptoms could be detected.

In another patient spirochaetes were found in the sweat collected from him at the crisis of the infection, whilst in another case spirochaetes were met with in the tears. It seems, therefore, that these parasites may be present in very diverse parts of the body. In all these four cases the spirochaetes were very numerous in the peripheral circulation, but great care was taken to prevent any blood entering the various liquids examined.

E. H.

Wu Lien-Teh (G. L. Tuck). **Some Observations on Relapsing Fever at Tongshan.**—*North Manchurian Plague Prevention Service Reports* (1911-1913). 1914. London: Cambridge University Press. pp. 98-106. With 1 plate.

Since the beginning of 1912 numerous cases of fever had been observed among miners working in the Kaiping coal mines, and Dr. Andrew on his arrival there diagnosed the disease as relapsing fever and was successful in finding the parasites (*Spirochaeta recurrentis*). The following year the author visited the district and investigated the cause and mode of transmission of the disease. The epidemic occurred mainly among the miners, for out of 168 cases admitted into hospital between January and March, 1912, 158 were miners from the Tongshan district. After having made the diagnosis Dr. Andrew commenced intravenous injections of neosalvarsan in doses of 0·75 gm. Marked improvement was noticed 12 hours later, and only one death was recorded out of over 70 patients treated.

The conditions of life among the miners are then described and, as the men work in shifts and on returning from work occupy the beds vacated by their comrades, it is obvious that there is every opportunity of infection being spread by lice. Out of 32 patients examined all were infected with lice, but bed bugs could only be found in two cases. In five out of ten cases the stomach contents of these lice contained spirochaetes, often in great numbers, whilst no parasites could be found in the beg bugs. Neosalvarsan was administered to 22 patients in 0·75 gm. doses and in every case the symptoms of the disease disappeared within 24 hours. After an injection there was a marked leucocytosis, the total leucocyte count varying from 9,000 to 40,000. After mentioning the chief clinical features of the epidemic, the author describes a few illustrative cases, from which it is apparent that the relapsing fever of this district closely resembles that of other parts of China. Arrhenal was tried on a few patients, the drug being administered intravenously in doses of 0·016 gm., but its action was very uncertain and it was much inferior to neosalvarsan.

Finally, various measures are recommended for stamping out the disease, most of which are directed against the lice responsible for the transmission of the infection. The more important are systematic cleaning of the dwellings occupied by the miners, large free baths, and the provision of a large steam-pressure steriliser where the clothes of the coolies could be sterilised once a week free of charge.

E. H.

Casaux (J.). **Considérations épidémiologiques concernant la Fièvre Récurrente au Tonkin.**—*Bull. Soc. Méd. Chirurg. de l'Indochine.* 1914. Apr. Vol. 5. No. 4. pp. 142-150.

A review of observations on the epidemiology of relapsing fever in Tonkin, in which the author shows that it is almost certain that the disease has been endemic in the province for a long time but has only been recognised of late years. Its seasonal distribution supports the view that the infection is transmitted by lice, as it is especially frequent in winter, when the natives crowd together in houses.

E. H.

Darling (S. T.). **Relapsing Fever in Panama.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 279-282.

The relapsing fever of Panama is identical with the type occurring in both New York and Colombia and is caused by the same parasite, *Spirochaeta novyi*. The disease seems to have been introduced into the Canal Zone on the Atlantic side, probably from Colombian ports, *viâ* Colon, and one case in this town was detected in an American who had only arrived four days previously from a South American port near by. Since 1907 one third of the cases have occurred at Portobello, but from 1904 to 1913 only 46 cases have been observed all told, in the proportion of 9 whites to 4 blacks. Now, as the proportion of whites to blacks is only about 2 to 9, it is evident that there is a disproportionately large number of cases amongst whites, and Darling is inclined to believe that the Commission quarters and barracks never became infected, but the patients became infected by visiting native villages.

According to França, in Colombia the disease is spread by *Ornithodorus turicata*. In Panama the corresponding tick infesting the native houses is *Ornithodorus talaje*.

With regard to the specificity of strains the author remarks that the following points should be noted in attempting to determine the variety of spirochaete in any given case of spirochaetosis :—

"(a) Type of febrile reaction and gravity of disease.

(b) Species of susceptible animals and the type of infection in the same, *i.e.*, single or multiple paroxysms.

(c) Number, abundance, or relative sparseness of spirochaetes in the peripheral blood of the patient."

E. H.

Primet. **L'Emploi au Tonkin des Arsénicaux dans le Traitement et la Prophylaxie de la Fièvre Récurrente.**—*Trans. xvii Intern. Congress of Med.* London. 1913 Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 283-285.

The author gives a summary of the results obtained by various medical officers in the treatment of relapsing fever in Tonkin since the introduction of salvarsan. The wonderful efficiency of this drug is well shown by the following particulars.

In Nam-Dinh, according to Paucot, out of 102 patients injected subcutaneously with salvarsan there was a mortality of 5·9 per cent., whilst under ordinary circumstances the mortality would have been 50 to 75 per cent. In 87 injected intravenously with varying doses, the mortality was only 2·9 per cent. On the other hand, whatever the the dose injected, relapses were commonly observed, sometimes even double relapses. In twenty cases spirochaetes were again present in the blood during the relapses. The latter occurred on the 7th to the 25th, 26th and 29th day after treatment.

At Ha-Dong, Martin treated 270 patients with salvarsan and reduced the mortality from 40 to 3 per cent. The minimum efficient dose for an adult was found to be 0·2 gm. At Kien-An (Vassal and Herbin) out of 195 patients treated in the same way, only two died. The dose employed was 0·25 gm. in 200 or 250 cc. of fresh serum for adults, and 0·10 gm. for children.

At the native hospital of Hanoï, Mouzels treated 174 patients with salvarsan and the mortality was 3·44 per cent. The dose varied from 0·15 to 0·40, but this observer is of the opinion that 0·20 gm. is sufficient for an adult Annamite.

[All observers agree that intravenous injections are preferable to any other form of administration and this method is now being universally employed. In addition to arresting the course of the disease in the patients themselves, the sterilisation of the blood effected by an injection prevents any ectoparasites becoming infected, and thus epidemics are prevented from spreading.]

E. H.

Klemm. **Behandlung von Rückfallfieber mit Salvarsan (Ehrlich-Hata 606).** [The Treatment of Relapsing Fever by Salvarsan.]—*Arch. f. Schiffs-u. Trop.-Hyg.* 1914. Aug. Vol. 18. No. 15. pp. 528-530.

The author states that salvarsan is well-known as a specific for the treatment of relapsing fever, but its action depends on various factors, such as the way in which the drug is administered, the amount of the dose, and the period when treatment commences.

In Usumbara, German East Africa, the author has treated a certain number of cases, both European and native, and gives particulars of seven patients, some of whom showed relapses after having received injections of salvarsan. The results support the following conclusions.

During the first attack the injection of salvarsan, either intravenously or intramuscularly, causes the symptoms of the disease to disappear. A complete cure during the first attack, however, was only effected if the patient received an intravenous injection of at least 0·5 gm. salvarsan, preferably on the first day of the infection. When the drug was administered during the relapses, or intramuscularly so that the medicament was only absorbed slowly, or if in slight doses, the patient's body was not sterilised and in most cases further attacks were not prevented.

E. H.

Brault (J.) & Montpellier (J.). **Essai de Traitement de la Fièvre Récurrente Nord-Africaine par des Injections intra-musculaires d'Olarsol.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 473-475.

The authors have treated nine cases of relapsing fever with injections of Olarsol (a preparation of neosalvarsan suspended in oil). The substance was injected intramuscularly in doses of 0·2 to 0·45 gm. and in two cases produced a general reaction, in one patient taking the form of headache, bilious vomiting and diarrhoea, and in the other oedema followed by a slight albuminuria. In both cases the symptoms disappeared within 24 hours. The site of the injection generally continued sore for about a week, and in one or two patients was extremely painful.

In every case the drug seemed to have no effect on the course of the disease and therefore the employment of intravenous injections of

neosalvarsan must be used in preference to oily preparations of the same substance. The latter, being absorbed only very slowly, are of no use in the treatment of an infection like relapsing fever, in which the organism requires to be sterilised very rapidly.

E. H.

Foley (H.) & Vialatte (C.). **Traitement de la Fièvre Récurrente Nord-Africaine par le Néosalvarsan et l'Olarsol.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 569-571.

During a recent epidemic of relapsing fever at Beni-Ounif-de-Figuig (Sud Oranais) that occurred almost exclusively amongst the natives, the authors treated a certain number of individuals at various stages of the disease. Two methods were employed, either intravenous injections of neosalvarsan, or intra-muscular injections of an oily solution of the same drug, known as olarsol.

The results show that doses of 0·05 to 0·1 gm. of neosalvarsan per kilo body-weight, injected intravenously, are sufficient to cause the disappearance of all symptoms of the disease and to prevent relapses. The best results are obtained by administering the drug during the pre-critical period of the infection (see Levaditi, this *Bulletin*, Vol. 1, pp. 39–40), when rapid cures can be obtained with small doses.

Similar doses of olarsol injected intramuscularly were never efficacious, and did not prevent the occurrence of relapses.

E. H.

Sergent (Edm.) & Foley (H.). **Transmission de la Fièvre Récurrente par Dépôt sur les Muqueuses intactes du Produit de Broyage de Poux prélevés sur un Spirillaire.** *Compt. Rend. Soc. Biol.* 1914. Mar. 27. Vol. 76. No. 11. pp. 471-472.

The authors collected some lice from the body of a patient suffering from relapsing fever, towards the end of the first attack. Six days later these were crushed up in a few drops of saline and the liquid was placed on the nasal mucous membrane and conjunctiva of two monkeys, which both became infected, one seven and the other eight days later.

Lice from the same patient were collected four days after the end of the second attack, were immediately crushed and the resulting liquid was introduced into the conjunctival sac of an Arab. Although this liquid contained numerous spirochaetes this Arab never became infected, but it should be noted that the subject was syphilitic and had recently undergone a prolonged treatment with iodine and mercury.

E. H.

Sergent (Edm.) & Foley (H.). **Des Périodes de Latence du Spirille chez le Malade atteint de Fièvre Récurrente.**—*Compt. Rend. Acad. Sciences.* 1914. June 22. Vol. 158. No. 25. pp. 1926-1928.

During the course of an epidemic of North African relapsing fever (due to *Spirochaeta berbera*, Sergent and Foley, 1910) the authors collected blood from patients during the apyretic intervals and

inoculated it into monkeys in order to test its infectivity. The blood was collected from ten patients and the following results obtained :—

Day of apyrexia.	Result of inoculation into monkey.	Incubation period in the monkey.	Relapse of patient after —days.
2nd	+	9	6 days.
2nd	0	0	No relapse.
2nd	+	6	8 days.
4th	0	0	No relapse.
5th	0	0	No relapse.
5th	0	0	No relapse.
5th	+	6	8 days.
6th	+	5	(?)
7th	+	4	8 days.
9th	0	0	13 days.

In every case the blood inoculated was carefully examined, both fresh and stained, but in no case were any spirochaetes observed, nor any abnormal appearances. Yet, with the exception of the individual in which the relapse was very much delayed (thirteen days), in all cases this blood was infective. Moreover, it will be observed that the incubation periods of the monkeys inoculated with blood during the later part of the apyretic interval are shorter than those infected with blood collected during the earlier part. This fact supports the idea of a periodic development of the parasite within the body, and proves that the blood is still infective during the apyretic intervals when no spirochaetes can be detected.

In 1908 the authors* made analogous observations in the case of lice that had fed on patients infected with relapsing fever. E.H.

Sergent (Ed.). & Foley (H.). **De la Période de Latence du Spirille chez le Pou infecté de Fièvre Récurrente.**—*Compt. Rend. Acad. Sciences.* 1914. July 6. Vol. 159. No. 1. pp. 119-122.

The authors call attention to the fact that in 1908–1909† they demonstrated the transmission of relapsing fever by means of the body-louse. The part played by this insect was shown by (1) an epidemiological study, (2) the infection of monkeys by the inoculation of the bodies of lice collected from infected patients, and (3) by feeding infected lice on two healthy persons who became infected as a result of this procedure.

The rôle of the louse in the transmission of this disease having thus been established experimentally, it remained to study the morphological changes undergone by the spirochaete in the body of its invertebrate host.

This year the authors have made further researches on the subject and obtained the following results. In every case after the infecting feed the lice were fed on normal subjects and examined daily by crushing a few, preparing films, and staining with Giemsa.

Lot 1. Lice having made a single infected meal; at least four lice examined daily until the fourteenth day. From the first to the eleventh day, in 45 lice, no spirochaetes. On the twelfth day spirochaetes appeared, becoming more and more numerous on the thirteenth and fourteenth days. From the twelfth to fourteenth days out of twelve lice, five contained spirochaetes.

**Ann. Inst. Pasteur*, 1910, Vol. 24, p. 337.
†*Bull. Soc. Path. Exot.*, Vol. 1, p. 176 and loc. cit.

Lot 2. Lice having made two infected meals; at least four lice examined daily until the sixteenth day.

At the end of 5 hours, out of 6 lice, 3 contained spirochaetes.

At the end of 24 hours, out of 6 lice, 1 contained spirochaetes.

From the 2nd to the 10th day out of 34 lice, 0 contained spirochaetes.

From the 11th to the 16th day out of 20 lice, 5 contained spirochaetes.

In another series (Lot 3) spirochaetes were found in lice up to the 25th day after an infected meal; whilst in a further series (Lot 4) out of 500 lice having made a single infected meal, out of 122 lice examined between one and eleven days later, none contained spirochaetes.

The results of the inoculation experiments are also very interesting. Lice having had a single infected meal, then nourished on healthy subjects, were ground up and inoculated into monkeys after varying intervals as follows:—

1 day	after the infected meal	out of	5	monkeys inoculated	1	became infected.
2 days	,,	,,	5	,,	3	,,
3 ,,	,,	,,	6	,,	1	,,
4 ,,	,,	,,	4	,,	1	,,
5 ,,	,,	,,	1	,,	1	,,
6 ,,	,,	,,	4	,,	4	,,
8 ,,	,,	,,	1	,,	1	,,
9 ,,	,,	,,	2	,,	0	,,
10 ,,	,,	,,	1	,,	0	,,
11 ,,	,,	,,	1	,,	0	,,

In a further series of experiments with Lot 4 mentioned above, the following results were obtained:—

10 lice inoculated into a monkey				the 3rd day after the infected meal produced no infection.
10 ,,	,,	,,	,,	5th day after produced infection.
10 ,,	,,	,,	,,	10th day after produced no infection.
10 ,,	,,	,,	,,	11th day after produced no infection.

It seems, therefore, that during the eight days following a meal of infected blood, the body of the louse does not contain any spirochaetes, but these reappear later, and these results agree with the observations of Nicolle, Blaizot and Conseil in 1912. But, nevertheless, during this period the lice contain an infecting virus.

One must admit, therefore, that the spirochaete of relapsing fever can take on another minute form which is equally virulent, and probably takes a similar form in the blood of an infected patient during the apyretic intervals between the attacks.

The authors consider that the existence of this cycle of development is an argument in favour of the protozoal nature of the relapsing fever spirochaete.

[The earliest work on the transmission of relapsing fever by lice was done by Mackie in 1907 during an epidemic in India. Sergent and Foley published the results mentioned at the commencement of the above paper in 1908–1909, whilst later Nicolle, Blaizot and Conseil repeated these experiments and suggested the probable mode of infection, namely, that the infective material contained in the body of an infected louse penetrates the skin through the excoriations produced by scratching. Sergent and Foley do not seem to have looked for the presence of a granular or coccoid phase of the spirochaete during the period when spirochaetes, as such, cannot be found in the body of the louse.]

E. H.

Sergent (Edm.), Foley (H.), Gillot (V.) & Béguet. **Sur les Pouvoirs Spirillicide et Agglutinant du Sérum des Malades et des Convalescents de Fièvre Récurrente.**—*Compt. Rend. Soc. Biol.* 1914 July 3. Vol. 77. No. 23. pp. 226-229.

During the epidemic of relapsing fever that occurred in Algeria during 1914, the authors investigated the sera of certain patients, in order to determine whether antibodies were present during the various attacks and also in the apyretic intervals. The sera of 29 patients were examined in this way as well as three infected monkeys, and as controls the sera of five healthy men and one monkey. The results with the human sera were as follows :—

During the first and second attacks no agglutinating properties can be detected and the spirillicidal power is either *nil* or very feeble. During the apyretic interval between these attacks both agglutinating and spirillicidal properties appear in the serum, but the spirillicidal power is weaker in the same patient during the last days of the apyretic interval than during the first. After the second attack both properties are more marked than after the first.

In a patient whose first attack had been cut short by an injection of neosalvarsan, the spirillicidal properties of serum taken five days later, although distinct, were not considerable in comparison with those of untreated patients. The existence of agglutinating properties is not necessarily associated with spirillicidal powers, and Metchnikoff has noticed that agglutination is not an essential condition for the disappearance of the spirochaetes from the blood. If the serum is heated to 56° C. for half an hour the spirillicidal and agglutinating substances are still active.

With the monkeys the serum of those individuals that had a slight infection four months previously possessed no spirillicidal properties, whilst that of an animal that had suffered from a severe infection six weeks previously immobilised spirochaetes in four hours. The latter did not become infected when inoculated with infected blood seven days after being examined, whilst two out of the three remaining monkeys, whose sera did not contain spirillicidal substances, and which were inoculated at the same time, became infected.

It is evident from these results that one can diagnose relapsing fever by means of its serum reactions, and the examination of the serum from a convalescent who had suffered from an undiagnosed fever clearly indicated that this had been a case of relapsing fever.

E. H.

Sergent (Edm.) & Foley (H.). **De l'Immunité dans la Fièvre Récurrente.**—*Compt. Rend. Soc. Biol.* 1914. July 10. Vol. 77. No. 24. pp. 261-263.

It is well known that in certain cases patients who have recovered from an attack of relapsing fever may be reinfected, and in monkeys Nicolle and Blaizot found that the immunity following an attack is sometimes less than six to nine months. The authors made various observations on this subject during the Algerian epidemic of 1914 and experimented on monkeys, in addition to observing human cases.

With monkeys it was found that an animal which had suffered from a severe attack was immune against re-infection one and a half months later, and its blood possessed spirillicidal properties *in vitro*. Another monkey was still immune four months after an attack, but the spirillicidal properties of its blood had disappeared. In the case of a slight infection immunity was hardly present four months after the attack, and the only evidence of its existence was the mildness of the second infection.

In man the immunity acquired by an attack of relapsing fever is not of very long duration and disappears after a few years. Nevertheless, reinfections differ from the first ones in the absence of relapses, and thus one of the principal characteristics of the disease is not developed.

E. H.

Grenier (M.). **Etude Expérimentale de** *Spirochaeta berbera.*—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 565-568.

The author has studied the receptivity of various laboratory animals to *Spirochaeta berbera*. Like Nicolle and Blaizot he was able to infect adult rabbits, by injecting them intravenously with 5 cc. of human blood containing the parasites, and several passages could be made in rabbits. Infection was obtained with only 2 cc. of infected blood when injected intra-cardiacally.

In addition the author finds that very young rabbits, not more than three or four weeks old, can be infected by subcutaneous inoculations of infected blood. As a general rule the parasites appear in the circulation 24 hours later and persist for two to five days, after which they disappear and no relapses are observed.

Out of eleven mice inoculated with infected blood only one showed spirochaetes in its blood. This individual was inoculated at the base of its tail. A jerboa was found to be susceptible to subcutaneous inoculation. Six rats, two fowls, four guinea-pigs, three sparrows and three swallows were all inoculated subcutaneously with infected blood, but gave entirely negative results.

E. H.

Leishman (W. B.). **Relapsing Fevers.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect xxi. Trop. Med. & Hyg. Pt. 2. p. 282.

The author adds some important notes on the nature of the chromatic granules observed by him in *Ornithodorus moubata* infected with *Spirochaeta duttoni*, and considered as part of the life-cycle of this organism. His study of a small number of species of ticks does not support the view that these granules are found in species of tick not known to transmit any spirochaetosis, for typical granule clumps were only observed in *Ornithodorus moubata*, *O. savignyi* and *Argas persicus*, all ticks which are known to transmit such infections.

Employing dark-ground illumination, continuous observation of these granules with the microscope in a thermostat has shown the author, in the case of two ticks, the definite extrusion of small and actively motile spirochaetes from these granule clumps.

The author concludes :—

" I am still of the opinion that the clumps I described are derived from spirochaetes ; that after about ten days at a temperature of 28–30° C., and with a relatively high humidity, some of these clumps give rise to young spirochaetes, which become free, are actively motile, multiply by fission, and may persist in the tissues of the tick for many months."

E. H.

Balfour (Andrew). **Notes on the Life-Cycle of the Sudan Fowl Spirochaete.**—*Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 275-278.

In this interesting article the author adds some remarks to his previous papers on the life-cycle of the Sudan fowl spirochaete. With regard to the nature of the intracorpuscular bodies, first observed by him, Balfour is of the opinion that such factors as temperature, atmospheric humidity, and general climatic conditions play a great part in determining the development of spirochaetes, both in the animal host and in the insect vector.* Although the nature of these bodies is yet unproved there is no doubt of their parasitic nature, and if they do not represent stages in the development of the spirochaete they must be a distinct parasite of fowls and geese, which can be conveyed by tick-bite and is closely associated with spirochaetosis. The author adheres to the former hypothesis and gives particulars of an experiment in support of his views.

A healthy chick freed from vermin was carefully isolated in a glass jar and on November 15th was fed with 90 washed tick eggs from mixed samples of *Argas persicus*. Many of these eggs contained granules but none showed spirochaetes. On November 23rd a few inclusions were found and after this a daily increase in their number was noted, multiple infection being observed on November 27th and " morula " stages on November 29th. On November 30th the chick first showed definite signs of illness, but from December 1st to 6th the bodies diminished in number and the bird improved in health. On December 7th, there still being a small " body " infection, spirochaetes appeared in the peripheral blood. They disappeared the following day and were never again found, but the inclusions persisted in the blood until the death of the chick on February 17th.

The author has obtained some evidence to show that *in vitro* the granules derived from the cell inclusions and also from tick's eggs may develop into spirochaetes. With regard to the shedding of granules from the spirochaetes, they are considered to be of the nature of resistant spores and are probably to be observed in other species.

The author adds a few words on the nature of the granules in the organs of the tick, and having examined many species of Acarines does not agree with Marchoux and Couvy regarding their wide prevalence in this group. In one instance, however, granules were found in the eggs laid by some *Hyalomma aegyptium*, but in another lot of eggs from the same source two *undoubted spirochaetes* were also found, although the ticks that laid these eggs could not have fed on any animal suffering from spirochaetosis for a very long time. E. H.

* In this connection it is interesting to note that in Cambridge, in spite of numerous efforts, Professor Nuttall has been unable to transmit *Babesia* (*Piroplasma*) *canis* from dog to dog by means of its invertebrate hosts, *Rhipicephalus leachi* and *R. sanguineus*.—E. H.

Mayer (Martin). **Uebertragung von *Spirochaeta gallinarum* durch Milben.** [The Transmission of *Spirochaeta gallinarum* by Mites.] —*Arch. f. Schiffs- u. Trop. Hyg.* 1914. Apr. Vol. 18. No. 7. pp. 254–255.

In the Tropical Institute at Hamburg the strain of *Spirochaeta gallinarum* is kept going in canaries. A canary that was injected with some other infection was found dead of spirochaetosis, and it was suspected that it had become infected by the agency of mites travelling from a canary infected with spirochaetosis, that had been kept in an adjoining cage.

Some of the well-fed mites found on the dead canary were placed in a cage with two fresh birds and after seven days one of the latter became infected and died of spirochaetosis.

It is uncertain whether the mites transmit the infection by their bites or through the birds swallowing them. These results clearly show that the canary mites, and probably also fowl mites, are capable of transmitting *Spirochaeta gallinarum*.

E. H.

Macfie (J. W. Scott) & Johnston (J. E. L.). **A Note on the Occurrence of Spirochaetosis of Fowls in Southern Nigeria.**—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 41-48. With 2 plates.

The authors record the presence of spirochaetosis in both fowls and ducks, near Lagos, Southern Nigeria. Notes on the symptoms of the disease and morphology of the parasite do not add anything new.

Three fowls were treated with injections of 3/50 gr. of atoxyl; two of the fowls recovered, in both cases the parasites disappearing after the first injection, but in the third individual, although three injections were given at three-day intervals, the parasites never disappeared and it succumbed to the infection.

Two fowls were treated with injections of 0·002 gm. of salvarsan. Each of the birds was cured by three injections, but in one case the parasites did not disappear until the third day after the first injection.

The "'after-phase' bodies of Balfour," although looked for carefully, were not observed.

E. H.

Launoy (L.) & Lévy Bruhl (M.). **Le Sang de la Poule dans la Spirillose expérimentale.**—*Ann. Institut Pasteur.* 1914. May. Vol. 28. No. 5. pp. 517-539. With 1 coloured plate.

The present article is a more detailed account of the results of the authors' investigations of the changes in the blood of fowls infected with spirochaetosis, and reviewed in this *Bulletin*.

The authors' conclusions are as follows:—

(1) Infection of the adult fowl with *Spirochaeta gallinarum* produces in that animal a very rapid and well-marked anaemia, the number of red cells sometimes being lowered by one half in five days. From a haematological point of view this is the most characteristic phenomenon. By its intensity and certain characters of the anaemia (polychromatophilia, augmentation of the globular value) fowl spiro-

chaetosis resembles the so-called pernicious anaemias, but it is distinguished by the rapid recovery, which is complete ten days after the crisis.

(2) This anaemia, and the recovery from it, is accompanied by variations in the leucocytes which evolve in a constant cyclical manner.

These results are shown in the following table, which apply to experiences obtained with a fixed virus (*i.e.* one which had been passed by inoculations through a number of fowls), but the infection following the bite of an infected Argas (first passage), although it was a little more severe, produced similar changes in the blood cells.

Day of the Infection.	Clinical Evolution.	Red Cells.	White Cells.
1 to 2	Incubation.	Commencement of anaemia.	Leucocytosis of polynuclears with rods.
3 to 5	During attack.	Progressive fall in number.	Leucocytosis of neopolynuclears.
5 to 6	Crisis.	Maximum anaemia (50 per cent.)	Leucopenia.
6 to 10	Convalescence.	Rise in number.	Leucocytosis of mononuclears.
6 to 10	Recovery.	Normal.	Normal, or sometimes slight leucocytosis with the normal formula. Sometimes prolonged mononucleosis.

(3) The spleen does not seem to play any part in the production of these modifications of the blood. Its removal is not followed by any alteration in the haematological evolution of the disease, outlined above.

In a footnote to the article it is stated that Launoy and Defaix, under certain conditions, have been able to keep *S. gallinarum* for at least four months in the ice-chest, without the parasite losing its virulence.

E. H.

Taylor (J. A.). **Bronchial Spirochaetosis in Uganda, with Pneumonic Symptoms.**—*Ann. Trop. Med. & Parasit.* 1914. Apr. 21. Vol. 8. No. 1. pp. 13-18. With 2 charts.

Several cases of pneumonia presenting unusual features were observed by the author in the Entebbe Civil Hospital, and also elsewhere in Uganda. These cases were all among natives, but the definite and constant symptoms and the finding of a large number of spirochaetes in the sputum of two recent cases make it possible that the condition may be caused by the extension of these parasites along the air passages. The history and course of the disease is as follows : —

"For a few days the patient has a cold, but otherwise feels well and is doing his ordinary work. More or less suddenly a headache develops, with some photophobia, and complaint is made of pains in the limbs and various parts of the body, but especially about the chest. The patient feels hot and begins to expectorate sputum streaked with blood. He passes a rest-

less night, the pain and constant coughing preventing sleep, and in the morning appears to be in such a serious condition that his friends think he is about to die, and bring him to the hospital. On admission the case appears, at first sight, to be one of typical pneumonia of several days' duration, and it is difficult to believe that the patient felt well and was doing his ordinary work on the previous day. The temperature varies between 102° and 104°, pulse 120 to 140, respirations 25 to 40. The cough is troublesome and a quantity of typical, tenacious, rusty-coloured sputum is expectorated. The patient complains of headache and pain in the chest, chiefly behind the sternum. On examination of the chest, sometimes nothing definite can be determined, but more often fine crepitations are heard posteriorly over a small and well defined area in the inferior lobe. In the cases I have seen, only one (the right) lung has shown any signs of being affected. Usually neither dulness nor bronchial breathing can be made out with certainty. The patient remains in the same condition from a few to forty-eight hours, when the temperature suddenly falls to subnormal, and he feels comparatively well and makes an uninterrupted recovery without any relapse. The sputum remains rusty for perhaps thirty-six hours after the fall of temperature, then gradually becomes more like that of an ordinary cold and continues for a week or ten days in diminishing quantities."

The author then describes two cases in detail, in addition giving temperature charts.

Numerous spirochaetes were found in the sputum of the patients examined, and the total disappearance of these parasites within a few days, and the fact that the decrease in their numbers synchronized with the abatement in symptoms, is very strong evidence in support of the view that they are the causative agents of the disease.

[Bronchial spirochaetosis seems to be widely distributed in the tropics, for it has been recorded from Ceylon, the West Indies, the Philippine Islands, Sudan, and now from Uganda.]

E. H.

Harper (Frank S.). **Bronchial Spirochaetosis.** *Jl. Trop. Med. & Hyg.* 1914. July 1. Vol. 17. No. 13. p. 194.

The author briefly describes a case which came under his notice at Tamale, Northern Territories, Gold Coast. The patient complained of cough, wasting, profuse expectoration which had never been blood-stained, and had been ill about six months. On examination of the sputum numerous spirochaetes were found, and the author is of the opinion that this was a case of chronic bronchial spirochaetosis which had followed an acute attack. This, the author believes, is the first case of this infection reported from West Africa.

E. H.

SLEEPING SICKNESS.

STARGARDT. **Syphilis und Trypanosomiasis (Schlafkrankheit).**—*Dermatol. Wochenschr.* 1914. Ergänzungsheft zu Band 58 (Festschrift). pp. 112-132.

Comparisons of syphilis and trypanosome infections have frequently been made. Dourine has often been likened to syphilis and general paralysis to sleeping sickness, at least in so far as their morbid anatomy is concerned; furthermore the interstitial keratitis of hereditary syphilis is very similar to that due to trypanosomiasis. The correspondence of the two diseases is, however, much deeper than was at first thought, and in this paper the author discusses the clinical and pathological similarities. Such correspondence is found from the beginning to the last stages of the infections.

Recent observations have shown that frequently there is some local reaction at the site of the bite of an infective insect; this has been called the "trypanosome chancre." What period elapses between the bite and the appearance of the local lesion is not yet definitely settled, but by some observers it is given as a few hours. There is a certain amount of experimental evidence supporting the view that the trypanosome chancre results from a local multiplication of trypanosomes. The work of SCHUBERG and BÖING is referred to in this connection (see this *Bulletin*, Vol. 2, p. 126). When rat's blood heavily infected with nagana was injected under the conjunctiva in rabbits a general infection soon followed, and the local reaction was not to be distinguished from that resulting from a natural infection of the disease. If on the other hand only a few trypanosomes were injected under the conjunctiva, little nodes of inflammatory thickening, very similar to the primary syphilitic affection of the conjunctiva, appeared before the trypanosomes were found in the blood. The author explains the fact that these primary lesions have not yet been observed in natives by the suggestion that they, as a rule, only come under observation a considerable time after infection has occurred, and that such furuncles might readily be overlooked or quickly forgotten by the native.

Reference is made to the transmission of sleeping sickness by coitus. KUDICKE has recorded a number of such cases in women who lived in Glossina free districts and who contracted the disease from infected men. Stargardt suggests that it would be of interest to determine whether primary lesions were to be observed in these cases.

Similarly, in the second stage of syphilis and trypanosomiasis a like correspondence is noticeable. The spirochaetes and trypanosomes enter the blood stream and multiply. There is the same general and painless enlargement of the lymphatic glands. Sometimes, especially in natives, the skin rashes resemble very closely those of syphilis; such a case is described by RINGENBACH (see this *Bulletin*, Vol. 3, p 35). The histological findings in the skin lesions of both diseases are similar: they are the result of multiplication of the parasites in the tissues. The author considers it worthy of remark that neither the spirochaetes nor trypanosomes wander at random into any tissue whatsoever, but at a definite time they seek out by preference a certain tissue: thus, when they have multiplied to a certain extent in the blood of the freshly infected animal, both invade by preference the skin.

Again in the later stages of syphilis and sleeping sickness there are many resemblances, side by side with, of course, many differences. The late syphilitic lesions may be divided into gummatous and non-gummatous lesions; the latter comprise such lesions as general paralysis, tabes, optic neuritis and the joint affections in general paralysis and tabes. Only these non-gummatous lesions have their counterpart in trypanosomiasis. Stargardt lays stress on the point that it is only when the parasites have escaped into the tissues that these lesions result. He inoculated guinea-pigs with *T. evansi*; not the slightest change was observed in the retina—either with the ophthalmoscope or on post mortem examination—even when the blood vessels of the retina contained as many trypanosomes as red blood cells; it was only when there was active invasion of the tissues of the eye that inflammation of the retina was noticed. Exactly the same holds true of the brain; so long as the trypanosomes remain in the blood vessels there are no inflammatory lesions in the brain. The idea that the inflammatory lesions are due to toxins formed by the trypanosomes in the circulating blood is dependent on the fact that the parasites have not been demonstrated in the brain of sleeping sickness patients. This failure, however, is one of technique and due to want of proper fixing immediately after death. Wolbach and Binger (see this *Bulletin*, Vol. 1, p. 132) demonstrated the existence of trypanosomes in the brain of monkeys exhibiting well marked nervous symptoms. It is to be remarked that the sites in which these authors found the trypanosomes are similar to those in which Noguchi demonstrated the presence of *Spirochaeta pallida* in general paralysis. Embolism of the capillaries by trypanosomes does not, in the author's opinion, play any part in the production of symptoms, because neither in sleeping sickness nor in general paralysis are the parasites numerous enough to cause a real obstruction of the vessels. The symptoms due to embolism produced experimentally by infecting mice and guinea-pigs with *T. evansi* are quite different. Mice may suddenly fall dead and guinea-pigs develop characteristic apoplectiform seizures. Details are given of a number of such observations.

The variation of the symptoms in both general paralysis and sleeping sickness are dependent on the different localisations of the organisms in the central nervous system.

Further resemblances between syphilis and trypanosomiasis are found in the lesions of the eyes. Iritis and irido-cyclitis are met with in both syphilis and sleeping sickness. In all the inflammatory lesions of the eyes the parasites can be demonstrated in the tissues. Stargardt refers to the various lesions which have been described by different workers and contrasts them with those described in syphilis. The author examined the manner in which the trypanosomes invade the tissue by observing the parasites in a piece of cornea from a nagana infected dog with commencing keratitis.

In spite of the many resemblances between sleeping sickness and syphilis there are however definite differences, of which the principal concerns hereditary transmission. This is exceedingly common in syphilis, but appears never to occur in sleeping sickness. Stargardt found that the foetuses of mice and guinea-pigs heavily infected with *T. evansi* were sterile. Section of the placenta revealed enormous

numbers of parasites in the blood vessels of the maternal portion, whilst those of the chorionic villi were free from trypanosomes. It is very striking that the same trypanosomes which can penetrate the uninjured conjunctiva cannot pass the thin membrane of the chorionic villi. NATTAN-LARRIER'S theory that the freedom from infection of the offspring is due to antibodies derived from the mother is criticised on the ground of the histological findings in the placenta, and on the fact that antibodies could hardly be present in the maternal blood in view of the enormous swarms of parasites encountered. Again there is no reason to believe that the foetus itself is able to form antibodies, as newly-born animals are readily susceptible to infection. There is no well authenticated case of hereditary transmission of human trypanosomiasis from mother to child.

The paper closes with a brief discussion of the affinities of *Spirochaeta pallida*—whether it belongs to the bacteria or to the protozoa.

W. Yorke.

MARTIN (Louis), DARRÉ (Henri) & DUMAS (Julien). **Sur un Cas de Fièvre Intermittente Trypanosomiasique causée par un Parasite Atoxyl-Résistant.**—*Bull. et Mém. Soc. Méd. des Hôpit. Paris*, 1914. July 9. Vol. 30. No. 24. pp. 49-60. With 2 charts.

This is a report of a case of sleeping sickness which presented certain peculiarities both from the clinical and therapeutic points of view. Clinically the affection was characterised by a regularly periodic intermittent fever; the disease was the result of a trypanosome which was atoxyl resistant. The patient contracted infection near Bangui (probably), in French Congo.

A detailed clinical account of the case is recorded. The attacks of fever, which recurred at intervals of 8 to 10 days, were accompanied by a moderate degree of splenomegaly. At the commencement of these attacks, which have been repeated for some months, examination of the blood revealed the presence of numerous trypanosomes; during the intervals it was impossible to detect them. The exacerbations of fever have persisted in spite of regular atoxyl treatment in 0·5 to 1·0 gm. doses; the silver arsenical preparation of DANYSZ was equally inefficacious. Intravenous injections of potassium emetic associated with subcutaneous injections of atoxyl resulted, however, in a prolonged remission which still persists.

Guinea-pigs infected with the trypanosome by subinoculation from a monkey (patas), which had been infected directly from the patient, were treated with large doses of atoxyl with no result. Other guinea-pigs were subinoculated from the first and some days later received a dose of atoxyl; in spite of the treatment trypanosomes appeared in their blood without any prolongation of the incubation period.

In this case it was quite impossible to cause definitive disappearance of the trypanosomes from the blood of the patient, in spite of the largest doses of atoxyl which could be administered without exposing the patient to the risk of grave toxic effects. The atoxyl resistance of the strain was absolute.

W. Y

Schleich (Rudolf). **Klinischer Beitrag zur Psychose bei Trypanosomiasis.** [Clinical Contribution on the Psychoses of Trypanosomiasis.]—*Inaugural-Dissertation zur Erlangung der Doktorwürd in der Medizin, Chirurgie und Geburtshilfe unter dem Präsidium von Professor Dr. Gaupp.*—1914. 48 pp. Tübingen: Verlag von Franz Pietzcker.

This paper, which is a thesis for the degree of Doctor of Medicine, deals with the psychoses met with in sleeping sickness. The clinical history of a case of human trypanosomiasis and the pathological findings are given in great detail.

The author observed well-marked psychoses in two cases of sleeping sickness; this is in accordance with the more recent literature and shows that mental disturbances may be expected in this disease. Reference is made to Mense's handbook on tropical diseases, pointing out that the mere exhibition of psychical disturbances is not sufficient to distinguish between trypanosomiasis and general paralysis. The author writes:—

1. In the course of sleeping sickness the sudden appearance of mental symptoms should be looked for in every case.
2. In forensic cases medical experts should always consider, in crimes committed by individuals who may be suffering from trypanosomiasis, the possibility of acute trypanosomiasis psychosis.
3. In patients in the third stage of sleeping sickness there always exists the possibility that in consequence of the sudden appearance of psychic disturbances they may become homicidal or suicidal. In looking after such cases it is therefore necessary to take precautions so that they can at any time be placed under restraint.

W. Y.

Kuhn (Philalethes). **Die Schlafkrankheit in Kamerun.** [Sleeping Sickness in Kamerun.]—*Medizinische Klinik.* 1914. July 5. Vol. 10. No. 27. pp. 1131-1135. With 1 sketch map.

This paper gives a sketch of the condition of sleeping sickness in Kamerun. There are at the present time in Kamerun four separate sleeping sickness regions, viz.:—(1) the Mbo-Ebene district; (2) the region of the upper Njong and upper Dume; (3) the Sanga-Ubangi district; and (4) the country of the Lvindo or Aina. The author gives a brief account of the disease in each of these four areas.

As a result of his observations Kuhn strongly suspects that the disease is smouldering in remote regions of the Protectorate, and he entertains the fear that, given favourable circumstances, it will burst into flame just as in the large known foci of the disease.

The remainder of the paper is taken up with a brief description of the measures which are adopted to combat the disease in the four districts mentioned above.

A map is given showing the position of the four chief centres of the disease.

W. Y.

Allard. **La Maladie du Sommeil au Mossi en 1906.**—*Ann. d'Hyg et Méd. Colon.* 1914. Apr.-May-June. Vol. 17. No. 2. pp. 479-482.

Sleeping sickness at Mossi* is stated by the natives to have been

* To the north of the Northern Territory of the Gold Coast.

known for a long time and there are histories of old epidemics. Besides isolated cases the disease progresses by terrible paroxysms, which coincide with the rainy season, and during which entire villages disappear. As a result of enquiries it would appear that the last great epidemic dates back 15 or 20 years. The disease spread from the south towards the north-west. The natives state that there has not been a true epidemic since the country was taken over by the Europeans; this the author regards merely as a coincidence, as the presence of the Europeans at Mossi has not altered in any way the distribution of the water courses nor resulted in any attack on Glossina.

Biting flies exist in great numbers, especially on the banks of the streams; the natives exercise great care to avoid building their villages near the banks of the Volta, which is at the present entirely deserted. The natives avoid the swamps, firstly, because of the pernicious effects which they attribute to humidity, and secondly, because the biting flies attack their cattle.

The author continues by giving an account of the ravages of the disease. Occasionally an attempt is made by the natives to treat the disease, especially the muscular feebleness. They have recourse to a plant (Pélaga or Vilouviga) which is made into a paste and rubbed all over the body. An infusion of the same plant is given as a draught. The results are generally nil. Nothing is done to the cervical glands except the scarification which the natives perform for all kinds of maladies.

A clinical account is given of a few cases which came under the author's personal observation. W. Y.

Lafont (A.) & Dupont (V.). **Sur les Résultats Eloignés du Traitement de la Maladie du Sommeil par le Ludyl et le Galyl.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 640-647.

Further details are given of the cases of sleeping sickness treated by the authors with ludyl and galyl (see this *Bulletin*, Vol. 2, p. 353). Of the 34 patients 15 are dead and 19 survive and are in apparent good health. Four of the 12 survivors who have been examined at the laboratory still show parasites; the most minute examination of the remaining 8 has not revealed the presence of trypanosomes. The authors give the following results:—Cured 44 per cent., surviving but not cured 19 per cent., surviving and in whom no trypanosomes can be found 37 per cent. Of 5 patients who were in a very advanced stage of the disease when treatment commenced all are dead; of the 15 who were in an advanced stage 9 are dead and 6 survive; of the 2 who were in a moderate condition both survive; and of the 12 who were treated at an early stage of the disease only 1 is dead, 3 are in apparently good condition but present trypanosomes, 5 show no parasites and 3 are in a good state of health but have not been examined for trypanosomes regularly.

Administration by ingestion or by intramuscular injection of a suspension in oil do not give good results; the best method is intravenous injection. It is to be hoped that by studying the proper spacing and size of the doses, the length of time required for treatment, the alternation of the products, etc., better results will be obtained.

In a later communication the authors will furnish data of the results of treating other cases of sleeping sickness with these drugs. W. Y.

Laveran (A.) & Roudsky (D.). **Sur un Dérivé du Diaminoarsénobenzène.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 593-596.

A derivation of diaminoarsenobenzol, prepared by Oechslin and referred to as O_1, was handed over to Laveran in order that its therapeutic value in trypanosomiasis might be examined.

As regards therapeutic properties the new product resembles closely arsenophenylglycin, but it possesses very appreciable advantages. Its preparation is relatively easy and it is less costly than arsenophenylglycin, a fact which is of considerable importance in the treatment of large animals. Again O_1 is much more stable than arsenophenylglycin: it is a light yellow powder very soluble in water and keeps well in sealed tubes even when they contain a little air; aqueous solutions keep at least 8 days in sealed ampoules containing very little air.

The drug is less toxic than arsenophenylglycin; a healthy mouse of 20 gm. tolerates 10 mgm., whilst mice of the same weight are killed by 8 mgm. of arsenophenylglycin. Infected animals are much more susceptible to the drug than healthy animals. In practice not more than 5 mgm. should be given to a mouse of 20 gm., 5 cgm. to a guinea-of 500 gm. and 25 cgm. to a dog of 10 kgm.. Repeated doses of O. can be given without danger. Solutions of the drug (4 per cent. in distilled water) should be given intravenously; if administered subcutaneously, painful oedema and even cutaneous gangrene may result. Sterilisation in the autoclave increases the toxicity of the drug. Solutions should be filtered before intravenous injection.

The action of the drug on mice, guinea-pigs and dogs infected with *T. brucei*, *T. gambiense*, *T. rhodesiense*, *T. dimorphon* and *T. congolense* was found to be much the same as that of arsenophenylglycin. The parasites disappeared from the blood of mice heavily infected with *T. brucei*, *T. rhodesiense* or *T. dimorphon* some hours after a subcutaneous injection of the product, and cures were obtained after a single injection of 5 mgm. or after three injections of 2 to 3 mgm. It was easy to produce the disappearance of trypanosomes from the peripheral circulation of guinea-pigs and dogs, but it is not yet known if relapses will occur and in what proportion of cases.

A guinea-pig infected with a strain of *T. gambiense* resistant to atoxyl was successfully treated with the new product.

W. Y.

Russo (Camio). **La Chemioterapia dell'Antimonio nella Trypanosomiasi sperimentale.** [The Treatment of Experimental Trypanosomiasis by Antimony.]—*Annali d'Igiene Sperimentale.* 1914. Vol. 24. (Nuova Serie). No. 2. pp. 353-373. With 18 diagrams.

The author refers to previous work on the therapeutic action of antimony in trypanosomiasis by Thomson and Cushny (*T. brucei*), Plimmer, Fry and Ranken (*T. evansi*), and Rowntree and Abel (*T. gambiense*). He also mentions the experimental findings of Kolle, Hartoch, Rothermundt and Schürmann in their treatment of experimental trypanosomiasis by trixidin (see this *Bulletin*, Vol. 2, p. 351). As infective material the author used nagana (Prowazek

strain), and his object was to obtain in rats a complete and lasting sterilisation by means of a single dose. The substances used were two in number, antimony trioxide of Kahlbaum and the metallic antimony of Merck. A large number of diagrams showing the results of treatment is given. The conclusions are :—

1. Metallic antimony has a better sterilising action in trypanosomiasis than trixidin, although hypodermic injections of it cause infiltration followed by necrosis in 20 per cent. of rats treated.
2. The drugs are lethal in doses of 100 mgm. per 10 gm. body weight.
3. Subcutaneous injection of 0·0005 gm. of trixidin produces definite cure.
4. Subcutaneous injection of 0·00025 gm. of trixidin is of value as a prophylactic, even when the rat is inoculated 24 hours after.
5. Trixidin *per os* in the dose of 0·05 gm. has a trypanocidal effect.
6. Metallic antimony injected in the dose 0·0004 gm. under the skin produces an unquestionable curative effect.
7. Metallic antimony in the dose 0·00006 gm. subcutaneously acts as a preventive.
8. Metallic antimony is useful *per os* in the dose of 0·005 gm.
9. The administration of metallic antimony in the form of lozenges is impracticable, because the animals after a few days refuse to eat them.

W. Y.

Russo (Canio). **Ricerche Chemioterapiche della Tripoflavina A e dell'Optochinum Basicum nella Tripanosomiasi Sperimentale.** [Researches on the Chemotherapy of Trypoflavin A and Basic Optochin in Experimental Trypanosomiasis]—*Malaria e Malat. d. Paesi Caldi.* 1914. May-June. Vol. 5. No. 3. pp. 162-179. With 8 diagrams.

Trypoflavin is one of a number of colouring substances derived from acridin ; it is the only one of these which possesses trypanocidal activity. The drug does not colour the tissues of the animal except at the point of injection, and the discolouration lasts only a few days. The author found that the drug both *in vitro* and *in vivo* exercised a sterilising effect on *T. brucei*. He carried out experiments, details of which are given, to show the effects of temperature upon the trypanocidal activity of trypoflavin A. He also observed the effects of the drug in the treatment of rats, using it both as a curative injection and also prophylactically. The conclusions are :—

1. Trypoflavin A exercises *in vitro* an energetic sterilising action (1 in 1,200,000) on *T. brucei*.
2. This trypanocidal action has a direct relationship to the time and temperature.
3. Administered subcutaneously the drug does not colour the skin or tissues ; it is more organotropic than parasitropic and has a relatively high toxicity.
4. Hypodermic injection of ·005 to ·025 gm. per 20 gm. of body weight caused in rats acute poisoning.
5. Doses of ·0001 gm. to ·0025 gm. are sufficient for a lasting internal disinfection.
6. Doses of ·00025 gm. to ·00012 gm. do not kill trypanosomes *in vivo* and the infection is always fatal.
7. The production of antibodies is combined with the destruction of the parasites by trypoflavin A, and the phenomenon of immunity lasts 20 to 30 days.
8. Injections under the skin of ·00025 gm. to ·00012 gm. are inactive from a curative point of view, but effectual prophylactically.
9. Trypoflavin A, given simultaneously with and in combination with basic optochin, displays an energetic sterilizing action against trypanosomes.

W. Y.

Ritz (H.). **Ueber einige Grundprinzipien der Chemotherapie.** Zugleich eine Erwiderung auf den Artikel von L. Brieger und M. Krause in dieser Wochenschrift, 1914, *Nr.* 3). [On some Fundamental Principles of Chemotherapy.]—*Berlin Klin. Wochenschr.* 1914. No. 20.

This paper does not record any further experimental observations. It is a rejoinder to the last article of Brieger and Krause [see this *Bulletin*, Vol. 3, p. 249], who had criticised the unfavourable results obtained by Ritz and Leupold in the treatment of experimental trypanosomiasis by tryposafrol and novotryposafrol.

In conclusion the author writes that, if their results are in direct opposition to those of Brieger and Krause, they must leave the decision to the examination of other workers. They do not intend to repeat their investigations as, after two years' work, the exact chemical constitution of the remedies is still unknown.

W. Y.

Oehler (Rud.). **Der Dimorphismus des *Trypanosoma brucei* bei experimenteller Behandlung.** [The Dimorphism of *T. brucei* in Experimental Treatment.]—*Zeitschr. f. Hyg.-u. Infektionskr.* 1914. June 24. Vol. 78. No. 1. pp. 188-192.

This paper is a continuation of a previous one on the dimorphism of *T. brucei*, where the author showed that the broad varieties are remission forms and the slender varieties exacerbation forms [see this *Bulletin*, Vol. 3, p. 539]. In the present paper the author refers to two conditions in which, by experimental treatment, relapses were produced and more or less numerous broad forms made their appearance. The origin of the strain with which these experiments were conducted (Braun and Teichmann St. 63) is given in the previous paper.

In the first series of experiments relapses were produced in mice by placing them in an incubator. It was found that mice tolerate a temperature of 35° C. quite well if supplied with water; the rectal temperature remains unaltered at 36° C. to 37° C. Temperatures of 38·5° C. are quickly fatal to mice, but this was hardly ever reached in infected animals kept in the incubator at 35° C and consequently the course of the disease was not interfered with. The author distinguishes mice of the 1st to the 10th passage after inoculation from guinea-pigs from those of later passages. The course of the disease in the former is chronic and is similar to that in guinea-pigs; death occurred in from 20 to 70 days, and in the majority of cases there were remissions, during which the trypanosomes completely disappeared from the blood. In these spontaneous remissions the number of broad forms was considerably increased. If such mice, showing more or less numerous trypanosomes in the blood, are placed in the incubator, remissions, with the appearance of broad forms, are observed with great regularity in from two to three days. After 10 passages in mice kept at room temperature the infection becomes acute and monomorphic, whilst, on the other hand, in mice which have been kept in the incubator the infection remains chronic, remittant, and dimorphic. After 20 or 30 passages death occurred in the mice kept at room temperature in from six to eight days without any remissions. The trypanosomes present were for the most part intermediate forms, but

there were also some slender forms. Only about one per cent. of broad forms were observed. Of those kept in the incubator at 35° C. only about half died from acute infection, and in the remainder the disease is sub-acute or chronic. Death occurred in from ten to twenty days; remissions and a corresponding increase of broad forms were observed in 30 per cent. of cases.

In a similar manner remissions can be produced by drug treatment. It was found, however, that after treatment by such drugs as salvarsan and tartar emetic the remissions were not accompanied by an increase in the number of broad forms. Possibly those drugs which cleared the trypanosomes from the blood in from six to eight hours acted too quickly, as with more slowly acting remedies, such as atoxyl and parafuchsin, broad forms made their appearance.

A further method of production of remissions is by simultaneous infection with the spirochaetes of relapsing fever. Mice which had been infected with *T. brucei* (St. 63) the previous day were inoculated with spirochaetes; trypanosomes appeared in the blood and increased in numbers, but on the appearance of spirochaetes remissions occurred. Frequently after the disappearance of the trypanosomes the spirochaetes also disappeared and there was a considerable protraction of the course of the disease.

As a result of his work Oehler concludes that the broad forms of the chronic nagana strains have nothing to do with sexual differentiation, but that they are the forms which the trypanosome assumes during remissions when the parasites are disappearing from the blood.

W. Y.

Schilling (Claus) & Schreck (Hans). **Trypanosomen-Studien.** *Arch. f. Protistenkunde.* 1914. July 6. Vol. 35. No. 1. pp. 1-23. With 19 text figs.

The first portion of this paper deals with the morphological characters of various strains of East African animal trypanosomes. The following strains were examined:—(1) *St. Ferox* of Ehrlich; (2) *St. Punda* from a chronically infected donkey; (3) *St. Kirundia* from a horse infected by *G. morsitans*; (4) *St. Gnu* from a gnu; (5) *St. Ngerengere*, obtained by feeding wild tsetses on guinea-pigs at Ngerengere; (6) *St. Glossina*, obtained by injecting the gut contents of wild tsetse flies into rats; (7) *St. Kibunga Rat A*, obtained by inoculating a rat with the blood of a reedbuck; (8) *St. Kibunga Mouse B*, obtained by subinoculation of a mouse from St. 7; (9) *St. Kibunga Rat C.*, obtained from St. 8 after several passages through rats; (10) *St. Kibunga Rat D*, the twentieth passage of St. 9 in rats; (11) *St. Kibunga Mouse E*, inoculated from St. 10; (12) *St. Kibunga Rat F*, obtained by passing St. 7 through 19 rats and two guinea-pigs.

Morphological details of each of the above 12 strains are given. Four biometric curves—100 trypanosomes seem to have been measured in each case—have been constructed from each strain dealing with the following points:—

(1) The distance between the posterior end of the parasite and the blepharoplast. (2) The distance between the posterior extremity and the middle of the nucleus. (3) The distance between the blepharo-

plast and the middle of the nucleus. (4) The total length of the trypanosome including the flagellum.

Regarding the first strain, the authors remark that the nucleus generally lies in the region between the middle and posterior thirds of the body. The blepharoplast is sometimes at the posterior end, very frequently close to it. The parasite is rather monomorphic; 60 per cent. of the individuals are from 19 to 22μ long; there are only very few short and long forms. In St. 2 the forms encountered varied in length between 13 and 29μ; the nucleus of the longer forms is near the middle of the body. In 13 per cent., however, the nucleus was situated near the blepharoplast. In St. 3 the parasites varied in length from 16 to 31μ; posterior nuclear varieties were encountered. In St. 4 chiefly short forms (65 per cent.) were encountered; in 18 per cent. the nucleus was situated near the blepharoplast. In St. 5, 74 per cent. of the parasites were 20μ or less in length; a number of long forms, however, of 32 microns in length were encountered. Posterior nuclear forms were also met. In St. 6 short forms preponderated; in 25 per cent. the nucleus was situated close to the blepharoplast. In St. 7 the forms met with were between 16 and 28μ in length. In St. 8 mostly short varieties with a large proportion of posterior nuclear forms were encountered; in 68 per cent. of the trypanosomes the distance between the blepharoplast and the middle point of the nucleus was less than 4μ. In St. 9 intermediate forms preponderated; the distance between the nucleus and the blepharoplast varied from 2 to 10μ. Strain 10 showed some short forms in which the nucleus lay near the blepharoplast. In St. 11 only a few short forms in which the nucleus and blepharoplast were close together were seen. In St. 12 examinations were made at 3-day intervals. On the 6th day of the infection, besides many short and intermediate forms, a considerable number of long forms were present; three days later the latter decreased in numbers and by the 12th day had almost disappeared, short forms greatly preponderating. On the 18th day the intermediate type again appeared to multiply, and on the 21st day many long forms were present.

The authors next consider the value of the biometric curves from the point of view of the differentiation of trypanosomes. They consider the curves made by them on different animals infected with the Kibunga strain. The first curve made from Rat E is of a definite dimorphic type. The second curve shows a great similarity to those of monomorphic trypanosomes such as *T. vivax* and *T. uniforme*, distinguished only by the position of the curve, whereas the curve made from Mouse E is quite different from either of the other two. The authors come to the following conclusions:—

1. Measurements of the trypanosomes in one or several blood films from an infected animal do not suffice to determine to which species the trypanosome belongs.

2. Variations in length of the various parasites in the same species of animal and even in the same individual are very marked.

3. The differentiation of a species through measurements is only of value either when curves are made from all experimental animals and in all stages of the infection, or when the fluctuations in the various dimensions in the course of the infection are repeated almost exactly periodically.

Whilst all the above strains belong to the *brucei* group, another strain, which differs considerably from these, was obtained from an

infected mule; where the animal was infected is unknown. Guinea-pigs and rats were infected from the animal; 81 per cent. of the individuals were between 12 and 15μ in length. The flagellum was short, the body plump, and even the longest forms had a thick body. It is probably identical with *T. congolense*.

The second part of the paper is concerned with *T. rhodesiense*. The authors write that "the type *rhodesiense* is not peculiar to human trypanosomes of Rhodesia and Nyasaland. It has been isolated from various animals infected in East Africa, e.g., Strains Punda, Kirundia, Gnu, Ngerengere, Glossina and Kibunga." Kinghorn, Yorke, Bruce and others have found trypanosomes with posterior nuclear forms in wild animals in Rhodesia and Nyasaland. These authors hold that *T. brucei* and *T. rhodesiense* are identical. In order to examine further the question of the identity of game and human trypanosomes, the authors have injected animals with their *St. Kibunga* previously treated with normal human serum. The action of the serum proved to be preventive. Hence they conclude that a strain in which 16 to 44 per cent. of the trypanosomes exhibit posterior nuclear forms is not identical with the human trypanosome.

[It is not easy to follow the curves and diagrams in the earlier part of the paper.]

W. Y.

Mesnil (F.) & Ringenbach (J.). **Sur le *Trypanosoma rhodesiense* et ses Affinités avec le *Tr. gambiense*. Quatrième Note.**—*Bull. Soc. Path. Exot.* 1914. July. Vol. 7. No. 7. pp. 612-618.

Reference is made to the fact that a monkey (Macacus) immune to *T. gambiense* proved susceptible to *T. rhodesiense*, and also to the observation of Laveran that a goat immunised against *T. gambiense* succumbed to subsequent inoculation with *T. rhodesiense*. Mesnil and Leger showed that mice cured of *T. rhodesiense* by means of arsenophenylglycin exhibited a fair degree of immunity to *T. gambiense*. All these observations indicate that the two viruses are distinct but allied species.

The observations recorded in this paper were made with a strain of *T. rhodesiense* obtained from the London School of Tropical Medicine from a patient (W.G.) who had contracted the disease in Rhodesia (see *Sleeping Sickness Bulletin*, Vol. 4, p. 19 and this *Bulletin*, Vol. 1, p. 274). The strain was isolated from the patient in 1912; the posterior nuclear forms are very rare and it is hence extremely difficult to distinguish from *T. gambiense*.

Experiments were undertaken with four goats, two having an acquired immunity for *T. gambiense* and two being normal animals. An immunised and a normal animal were inoculated with each of the two strains of *T. rhodesiense*—strain G and the original strain A, which has been kept two years in mice.

Goat B, previously immunised against *T. gambiense*, succumbed to infection with *T. rhodesiense* (Strain A) in 68 days; a normal goat B inoculated with the same strain died after 42 days. Goat C immunised to *T. gambiense* and subsequently inoculated with *T. rhodesiense* (Strain G) died after 53 days, whereas a normal goat C^1 inoculated with this strain lived for 60 days. The authors write that the two strains

of *T. rhodesiense* are very pathogenic for the goat in spite of many passages of the trypanosomes through rodents. The strains killed goats immunised against *T. gambiense*, but it is noteworthy that, in the case of virus A, the goat which had been previously immunised against *T. gambiense* lived considerably longer than the normal animal, but in the case of virus G there was but little difference between the course of the disease in the normal and in the immunised animals. These facts favour the conclusion that *T. gambiense* and *T. rhodesiense* are distinct.

On account of the rapid death of the goats, experiments on the protective power of their sera have given but little result. The sera of the two normal goats infected with the strain of *T. rhodesiense* did not show any activity against *T. gambiense*. The serum of goat B and of goat B^1 was active against *T. rhodesiense* (Strain A) but hardly at all against Strain G. Conversely the sera of goat C and C^1 was active against the virus G but not against virus A.

It was found that virus G was almost as sensitive to the preventive and curative action of human serum as virus A. The history of the patient shows that Strain G was much less susceptible to treatment by atoxyl than are infections by *T. gambiense*. Mesnil and Leger have shown that atoxyl acts just as well on mice infected with virus A as with *T. gambiense*. This, however, was not found to be the case with virus G. It was resistant to atoxyl. Infected mice were, however, cured by arsenophenylglycin and by a closely allied substance prepared by Oechslin (see page 258).

W. Y.

Ogawa. **Etude Morphologique et Biologique sur** *Trypanosoma pecaudi*. —*Ann. Inst. Pasteur.* 1914. July. Vol. 28. No. 7. pp. 677-691. With 7 curves and 1 text fig,

The strain of trypanosomes with which the work described in this paper was done was brought from Dahomey by Bouet and has been maintained by passage through guinea-pigs at the Pasteur Institute since 1908.

Details of the course of the infection in 15 guinea-pigs and 10 mice are given. The duration of the disease in guinea-pigs was 8 to 24 days (average 16) and in mice 6 to 15 days. In 7 of the guinea-pigs there was a definite crisis between the 5th and 12th day; the crisis lasted from 1 to 3 days.

Long forms, short forms and intermediate forms were observed. Amongst the short forms a number of individuals were seen with the nucleus situated close to the blepharoplast; occasionally it was found to be actually posterior to the blepharoplast. There appears to be a certain relationship between the course of the infection and the appearance of the various forms. At the beginning of the infection long forms are met with, towards the middle of the disease short forms are seen in large numbers, whilst in the last stages the long forms again predominate. In those instances in which the infection runs a very rapid course the long forms are the most numerous throughout.

A series of experiments was undertaken to ascertain the effect of temperature on the parasites. Heavily infected blood from the heart of guinea-pigs was mixed with physiological citrate solution and kept at different temperatures for various periods. It was found that the

two forms were equally susceptible to the deleterious influences of different temperatures; it is not possible to separate one from the other by this means.

The serum of guinea-pigs bled at the time of the crisis possesses a protective action against experimental infection. When the serum is mixed with the trypanosomes *in vitro* the latter are agglutinated.

Attempts to cultivate the parasites on the Novy-Nicolle medium were unsuccessful.

W. Y.

Ritz (H.). **Ueber Rezidive bei experimenteller Trypanosomiasis.** [On Relapses in Experimental Trypanosomiasis.]—*Deut. Med. Wochenschr.* 1914. July 2. Vol. 40. No. 27. pp. 1355-1358.

This paper, which is of a technical nature, deals with the properties of relapse strains. The trypanosome employed was *T. brucei* (Prowazek). In mice the parasites multiplied until the death of the animal without any remissions or relapses. In order to produce a disappearance of the trypanosomes from the blood with a subsequent relapse, small doses of neosalvarsan were administered intravenously and, when all the veins were used up, subcutaneously. About 200 mice were repeatedly treated with small doses of salvarsan in this manner and details of the relapses in two of them are given in the form of curves. The animals were inoculated with the original strain and after the appearance of trypanosomes in the blood were incompletely cured so that the parasites disappeared from the blood stream temporarily. On their re-appearance they were again expelled by another small dose of the drug and so forth. The process was repeated in one of the mice 10 times and in a second 20 times. After the third and fourth relapses respectively all the succeeding relapse strains were subinoculated and maintained by passage through normal mice. In this manner a considerable number of relapse strains were obtained and their properties subsequently examined.

In his conclusions the author writes that the processes in experimental trypanosome infections are rather complicated. The great variability of parasites in the presence of immunising influences is certainly of considerable significance, not only in trypanosome infections, but also in all relapsing diseases, especially in relapsing fever and syphilis. It follows from these investigations that for practical purposes immunotherapy is only conceivable when the possibility of modification of the parasites is limited, so that new relapse formation due to the formation of polyvalent sera in the course of the infection is excluded, as is the case in recurrent fever. In trypanosome diseases and also in syphilis on the other hand but little is to be expected from efforts to bring about a cure through immunising processes. In these conditions results are only to be expected from chemotherapy. The paper, which is rather technical, should be consulted in the original by those interested.

W. Y.

Battaglia (Mario). **Biologische Differentialcharaktere für einige Trypanosomen.** [Biological Differential Characters for some Trypanosomes.]—*Centralbl. f. Bakt.* 1. Abt., Orig. 1914. July 25. Vol. 74. No. 7. pp. 582-584.

The author discusses briefly the various means which have been adopted for the differentiation of trypanosomes. Morphology he considers to be of some value, but it is rather uncertain and unreliable. Natural immunity of certain animals to some trypanosomes and cross immunisation are of more importance. This criterion is not, however, infallible, as an example the author refers to the fact that guinea-pigs can sometimes be inoculated with *T. lewisi*. The agglutinins contained in the blood of certain immune or immunised animals for the corresponding trypanosomes are of some importance; this method, however, frequently fails because a serum may agglutinate a trypanosome and yet the animal become infected, and moreover the agglutinin may act on a whole group of trypanosomes and not on one alone. The ability to cultivate various trypanosomes on nutrient media, the method of development of the parasites, and the fact that others cannot be cultivated at all are of no value as a means to differentiation. Attempts to separate trypanosomes by means of precipitins meet with the same difficulties as in the case of agglutinins. It has been stated that some trypanosomes are parasites of vertebrates and others only of invertebrates; this statement is, however, very elastic and unreliable. The author considers that the susceptibility or insusceptibility of certain trypanosomes to drugs is unsatisfactory as means of differentiation. The value of biometric curves has been the subject of much discussion and of late has been severely criticised.

Battaglia gives the results of numerous experiments extending over several years on the attempt to differentiate between *T. vespertilionis*, *T. lewisi*, *T. brucei*, *T. dromedarii* and *T. gambiense*. The course of the infections in rabbits was examined and special reference made to keratitis and ulcerative granulomata of the genitals.

T. vespertilionis is always pathogenic for rabbits, but does not cause keratitis. *T. lewisi* is not always pathogenic, but still it causes keratitis and ulcerative granulomata of the genitals. *T. brucei* is always pathogenic in rabbits, and frequently evokes progressive keratitis and hard ulcerative granulomatous nodules. *T. dromedarii* (a strain of *T. evansi*) is always pathogenic in rabbits, and frequently causes keratitis, which is, however, progressive and tends to resorption. It gives rise to ulcerative granulomata of the genitals, but these are not so hard and nodular as those due to *T. brucei*. *T. gambiense* rarely causes keratitis, but is always pathogenic for rabbits. When injected into the genital organs it provokes an oedematous condition but no granulomata.

In conclusion the author writes that by this method the above five trypanosomes can be clearly differentiated.

[Although Battaglia claims to have infected rabbits and guinea-pigs with *T. vespertilionis*, Laveran and Mesnil state that inoculations of mammals, other than bats, have given negative results, and Laveran groups *T. vespertilionis* amongst the non-pathogenic trypanosomes (see *Sleeping Sickness Bulletin*, Vol. 3, p. 359)].

W. Y.

Mayer (Martin) & da Rocha-Lima (H.). **Zum Verhalten von *Schizotrypanum cruzi* in Warmblütern und Arthropoden.** [On the Behaviour of *Schizotrypanum cruzi* in Warm-blooded Animals and Arthropods.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 101-136. [pp. 257-292.] With 2 coloured plates.

After giving a brief history of the disease and its cause the authors record in detail the results of their experimental inoculations in animals at Hamburg. Mice and guinea-pigs were mostly used, but a number of monkeys, rats and rabbits were also inoculated. In monkeys the incubation period was 11–14 days and death occurred in 21–28 days. The course of the disease in guinea-pigs was generally chronic and in many instances recovery was noticed, but in others the infection was acute, terminating in death. No increase of virulence was found on passing the strain from guinea-pig to guinea-pig. In mice the disease was sometimes acute and sometimes chronic. The incubation period, which was at first 10–14 days, has fallen after many passages to about 6 days. At first only a small proportion of the animals died, now a great majority die in from 2–4 weeks. Only comparatively few rats were inoculated; infection occurred after 6–18 days. The animals recovered and were subsequently resistant. One rabbit was inoculated with the blood of an infected mouse, trypanosomes appeared in its blood after an incubation of about 14 days but soon disappeared; the animal proved to be immune to subsequent injections of virulent blood, and a mouse inoculated from it a year later did not become infected. The occurrence of late relapses is of interest; in one guinea-pig there was a relapse after a negative period of eight months. Rats, guinea-pigs and rabbits which recovered from infection generally proved to be immune, but the serum of such immune animals did not protect mice when injected either 24 hours before or, at the time of, inoculation. Complement absorption experiments with the serum of the experimental animals and the organ extracts of heavily infected animals showed no difference from the control experiments.

In the peripheral blood division forms were not seen; parasites, however, showing commencement of division of the nucleus, as already described by Chagas, were observed; sometimes leishmanial forms were noted.

The authors made a thorough investigation of the histological appearances of the various organs of infected animals. As a result of examining sections they found schizo-trypanosomes in the tissue cells as round parasites of a distinct size, often spindle-shaped through lateral pressure, which multiplied by repeated division, preserving their size and form. At the end of the development, when the last division has occurred, smaller individuals are visible which are quickly changed into trypanosomes; these soon leave the host cells and escape in the blood stream.

The normal development of the schizo-trypanosome in the organ cells did not appear to damage them in any way. Even the mechanical effects of the large masses of parasites are, at least in the muscle fibres, quickly and completely repaired. Toxic substances probably only

arise when the parasites are damaged for any reason. Damaged host cells always contain parasites which are morphologically changed and in which development has been interfered with. The general appearances and most probably the functional disturbances have no immediate relation to the multiplication of the parasites in the organ affected. A causative relation to the lesions only arises when the parasites undergo massive destruction, which leads to the destruction of the host cells and often, also, to pronounced inflammatory appearances. It is hence inadmissable to regard the demonstration of normally developing parasites as indicating anatomical changes and to draw from it the explanation of clinical appearances.

Animals of the same species, infected in a similar manner, and in which the disease runs the same clinical course, show, on histological examination of their organs, the greatest difference in the extent and severity of the lesions and also in the distribution of the parasites. The most severe lesions are found as a rule in muscles. The adipose tissue is, however, frequently the seat of marked degenerative appearances. The remaining organs on the other hand, although they frequently contain masses of parasites, show for the most part no changes.

The authors next record transmission experiments with various arthropods and refer to the development of *Schizotrypanum cruzi* in them. The development of the parasite in *Conorhinus megistus*, *Acanthia lectularia* and *Ornithodoros moubata* was followed in detail. Transmission through the bite of bugs and ticks was not determined with certainty in a large number of experiments. There are two questionable positive results.

A female *Conorhinus megistus* two years after infection, and numerous bugs 10 months after infection, excreted parasites in their faeces which were infective.

No development of *Schizotrypanum cruzi* occurred in *Stegomyia calopus* or in *Culex pipiens*.

Numerous experiments were undertaken to ascertain the thera peutic action of various substances on animals infected with the parasite. Quinine, trypanred, salvarsan, tartar emetic, parafuchsin, potassium iodide and sublimate were without action. Atoxyl had no effect on infected mice ; on the other hand, it appeared to be of some slight value in monkeys. Trypasafrol seemed at first to exert beneficial action on mice which were fed on it for some weeks : still mice which had been treated for several months relapsed.

The paper is illustrated by two coloured plates depicting the parasites as they appear in the blood and tissues of the vertebrate hosts, and also in the alimentary canal and faeces of the bugs and ticks.

W. Y.

Bruce (David), Hamerton (A. E.), Watson (D. P.) & Lady Bruce. **The Food of** *Glossina morsitans*.—*Proc. Roy. Soc.* 1914. Aug. 6. Vol. B 88. No. B 600. pp. 41-42.

Five hundred flies caught in the proclaimed area of Nyasaland were killed by chloroform and the gut of each was roughly dissected out, smeared on a slide, fixed by osmic vapour and alcohol and stained by Giemsa. The flies were caught in the bush away from the paths. Only 30 females were used. Of the 500 flies 288, or 57·6 per cent., con-

tained recognisable mammalian blood; the type of cell was chiefly such as occurs in antelope. In only three cases were nucleated red cells found. Thus one per cent. contained nucleated blood and 99 per cent. mammalian. From measurements it seemed probable that the nucleated blood was avian, not reptilian. The length of the corpuscles was 10 and 10·5 microns and that of the nuclei 4·4 to 4·8 microns. It is suggested that the nucleus is the better guide, as being less altered by digestion. In no case was vegetable matter noted. Of the 30 females 43·3 per cent. contained mammalian blood. From experiments in the laboratory it was found that blood is recognisable in stained specimens for two to three days after a feed; hence it may be inferred that half the flies examined had fed within three days of their capture and that the flies feed naturally at least once every six days.

[Kinghorn, Yorke and Lloyd reported that of 82 *G. morsitans* caught in Rhodesia, which contained recognisable blood, in 85 per cent. it was mammalian and in 14 per cent. non-mammalian.]*

A. G. B.

Nöller (Wilhelm). **Die Uebertragungsweise der Rattentrypanosomen. II. Teil.**—*Arch. f. Protistenkunde.* 1914. June 17. Vol. 34. No. 3. pp. 295-335. With 2 plates and 3 text figs.

The present paper contains an account of further work on the transmission of *Trypanosoma lewisi*, together with remarks on certain protozoal parasites of various fleas. With regard to *T. lewisi*, fleas become infected from newly-infected rats more easily than from chronic cases. While fowl-fleas can live for a week on rat blood, they do not act as transmitters, since they void little or no faeces when sucking. "Developmental forms" of the rat-trypanosome previously described by Prowazek, Baldrey and Rodenwaldt can be seen without difficulty in rat-lice during the first week of the infection of the rat, but the rat-louse is not regarded as a true transmitter. Trypanosomes are voided with the faeces of the rat-louse; they are only found in the body cavity of the rat-louse when injury to the gut has occurred. Experiments with *Melophagus ovinus*, fed once on infected rat blood (and afterwards on clean rats), showed that *T. lewisi* could live for two days in the insect when kept at 25° C.; after that the trypanosomes disappeared.

Apart from *T. lewisi*, other parasites of various fleas, both observed by Nöller and recorded by others, are briefly described. *Leptomonas ctenocephali* was found also in the larvae of dog fleas. *Malpighiella refringens* and *Nosema pulicis* were seen in dog fleas. The Nosema (which is figured) was present in about 6 per cent. of the dog fleas examined in Munich. In fowl-fleas and pigeon-fleas a Leptomonas was found. *Legerella parva* (a Coccidian, of which figures are given) was present in the Malpighian tubes of adult fowl and pigeon fleas. *Actinocephalus parvus* (a Gregarine) was found in the gut of all the larval fleas investigated.

H. B. Fantham.

**Ann. Trop. Med. & Parasit*, 1913. Vol. 7. p. 282.

Pringault (E.). *Cimex pipistrelli*, **Jen., Agent de la Transmission de la Trypanosomiase des Chauves-souris.**—*Compt. Rend. Soc. Biol.* 1914. June 5. Vol. 76. No. 19. pp. 881-883.

The first part of the paper deals with the various attempts made in the past to determine the transmitter of the trypanosome (*T. vespertilionis*) of the bat. Attempts to transmit the parasite by fleas, lice and ticks had previously all failed. Nicolle and Comte in Tunis had found fleas and bugs present on infected bats. Pringault examining bats captured in the neighbourhood of Oued Miliane and of Maxula Radès (Tunis) found the same condition. A nest of 19 bats (*Vesp. kuhli*) was captured and 118 ectoparasites were found in the nest and on the bats. 89 were bugs. Emulsions of some bugs in salt solution showed numerous trypanosomes.

Bats in which no trypanosome was seen in 8 daily examinations were considered normal. Five such bats were placed in contact with 45 bugs. Four of the five became infected, trypanosomes appearing in the circulating blood between the 27th and the 72nd hour after contact with the bugs. It is considered probable that the 5th bat had had a slight previous attack and so was immune.

Seven large bugs were crushed in 15 drops of physiological serum. Many trypanosomes were seen in the mixture examined ultramicroscopically, crithidial forms predominating. The mixture was injected subcutaneously to two bats. One bat, killed after 7 days, showed distended abdomen, hypertrophy of the spleen and large, fairly friable liver. It had abundant trypanosomes in the spleen, numerous forms in the liver, while trypanosomes were rare in the lungs and bone-marrow. The second bat died after seven days. Trypanosomes were found only in the blood.

The author concludes that the normal mode of transmission of *T. vespertilionis* is by the bug *Cimex pipistrelli*, and promises later an account of the evolution of the parasite in this bug.

H. B. F.

Pringault (E.). **Non-pathogénéité du** *Trypanosoma vespertilionis* **(Battaglia) pour les Animaux de Laboratoire.** *Compt. Rend. Soc. Biol.* 1914. June 5. Vol. 76. No. 19. pp. 883-884.

The present paper gives an account of the author's unsuccessful attempts to infect mice, guinea-pigs and rabbits with *Trypanosoma vespertilionis*. Intraperitoneal inoculations of good cultures of the trypanosome on NNN medium were given, large quantities of the culture being employed. Repeated blood examinations showed no trypanosomes and no lesions were found when the animals were killed. The author concludes that, in spite of the large quantity of culture injected, he could not infect his laboratory animals, so that the trypanosome was not pathogenic for them.

H. B. F.

Laveran (A.) & Roudsky (D.). **Contribution à l'Etude de la Virulence du *Trypanosoma lewisi* et du *Tr. duttoni* pour quelques Espèces animales.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 528-535.

Reference is made to the work of Roudsky which showed that it was possible to render *T. lewisi* pathogenic for mice and *T. duttoni* pathogenic for rats (*Sleeping Sickness Bulletin*, Vol. 3, p. 81 and Vol. 4, p. 126).

The authors give details of a number of inoculations of small rodents, including various species of rats and mice, and guinea-pigs with *T. lewisi* and *T. duttoni*. From these experiments it follows that intraperitoneal inoculation of small rodents such as field-mice (*Mus sylvaticus* and *Arvicola agrestis*), dormice (*Myoxus nitela*), *Meriones shawi*, *Gerbillus hirtipes*, *Jaculus orientalis* and guinea-pigs, with the blood of rats heavily infected with *T. lewisi* provokes as a rule infections of variable intensity. Sometimes trypanosomes are scanty and disappear after 24 to 48 hours and sometimes there is an infection characterised by phases of multiplication of the parasites, during which the multiplication forms of the trypanosomes are numerous, and by persistence of the parasites in the blood. Even in abortive cases, provided the animals acquired an immunity to *T. lewisi*, one can say that there was a true infection and not a mere passage of the trypanosomes in the blood.

In rodents other than rats inoculations " en série " of *T. lewisi* do not succeed, but from a consideration of their observations on the experimental infections of various species of rats and mice the authors conclude that it would not be very difficult to obtain strains of *T. lewisi* adapted to them, by the method by which they succeeded in rendering *T. lewisi* inoculable " en série " in the mouse and *T. duttoni* inoculable " en série " in the rat.

W. Y.

Brown (Wade H.). **Morphological and Developmental Anomalies of a Pathogenic Strain of *Trypanosoma lewisi* and their Relation to its Virulence.**—*Jl. Experim. Med.* 1914. June. Vol. 19. No. 6. pp. 562-569. With 2 plates.

The author refers to the work of Wendelstadt and Fellmer on the passage of *T. lewisi* through cold-blooded animals. The strain used by him was pathogenic and showed an unusual increase in virulence [see this *Bulletin*, Vol. 3, p. 542]. Equal binary longitudinal fission and, more rarely, unequal binary and multiple fission were encountered. Rapid multiplication with great numbers of irregular forms, especially small and imperfectly developed trypanosomes, is characteristic of an acute infection which occasionally terminates fatally at the height of multiplication. Sometimes with a normal rate and type of multiplication that period of the life cycle does not cease at the usual time, but continues on through the second or even the third week of infection, characterising a more severe but slowly progressing type of infection which may end fatally after the second week.

Small forms, 7μ to 8μ long, were found in some severe infections, and were comparable to the small infective forms from the invertebrate transmitter. Trypanosomes with elongate posterior extremity were seen, sometimes pointed, sometimes with a small bulbous extremity. On the other hand, the blepharoplast appeared almost terminal at times. In a few specimens suggestions of myonemes were seen.

Total absence of a stainable nucleus occurred in a few specimens, resulting from a typical division.

Blepharoplastless *T. lewisi* occurred spontaneously in either young or early multiplication forms with no evidence of degeneration or mechanical distortion.

The pathogenic strain of *T. lewisi* used has been inoculated into 82 rats. Most of the trypanosomes showed the anomalies of development and morphology mentioned above. A control strain, at first benign, was carefully examined, but subsequently showed increased virulence in certain series of infections coincident with the appearance of anomalous forms of trypanosomes in the blood of infected rats. The author states in conclusion that: "It could not be definitely determined to what degree these characteristics were co-ordinated with the virulence."

The author's summary is as follows:—

"1. The morphological and developmental anomalies of a pathogenic strain of *Trypanosoma lewisi* have been described to show the unusual character of the strain.

2. Especial attention is called to the spontaneous occurrence of ablepharoplastic forms of *Trypanosoma lewisi*.

3. It is pointed out that morphological anomalies were most pronounced in infections that showed unusual conditions of multiplication and that such infections usually proved severe.

4. Finally, an appreciable correlation between the morphological and developmental characteristics and the virulence as manifested in these examples of infection with *Trypanosoma lewisi* has been suggested."

H. B. F.

Carini (A.) & Botelho, Junior (C.). **Sur quelques Trypanosomes d'Oiseaux du Brésil.**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 395-398. With 3 text figs.

The authors give a list of the Brazilian birds previously found to harbour trypanosomes. Such birds are rare. They have only found three birds parasitised out of many examined.

1. Trypanosome of *Piaza cayana macrura*—dimorphic, slender forms and flattened stout forms were seen. Blepharoplast nearly terminal. Dimensions and sketches are given.

2. Trypanosome of *Batara cinerea*—dimorphic, rather like the parasite recorded in the preceding case. Sketches are given.

3. Trypanosome of *Pitangus sulphuratus maximiliani*. Two parasites only were found; they were rather alike, but one was slightly shorter and flatter than the other. Blepharoplast ovoid and subterminal. The parasites are figured and detailed dimensions are given.

H. B. F.

Mathis (C.). **Evolution d'un Trypanosome dans le Liquide Salivaire d'un Moustique.**—*Compt. Rend. Soc. Biol.* 1914. July 10. Vol. 77. No. 24. pp. 297-300. With 2 figs.

The author reviews briefly the records of the occurrence of flagellates of Culicines, which parasites are peculiar to the insects. He then states that he has found flagellates in a single smear of the salivary fluid of a Culex sp. captured in the open at Hanoi, and that he believes that the mosquito behaves towards certain species of trypanosomes as a true host. The flagellates under investigation were found only in the salivary fluid and not in the stomach, intestine or Malphigian tubes of the host. Two forms were present in a smear of the salivary glands:—(1) crithidial forms, separate or in rosettes; (2) forms typical of trypanosomes. Isolated crithidial forms were 21μ to 23μ by 1·8μ to 3·5μ. They had a thin undulating membrane. The flagella in rosettes were centrally directed, yet the author considers them to be multiplicative rosettes [and not agglomerative.] Oval and spherical forms were also found. The trypanosome forms were 10μ to 15μ long by 1·8μ to 2·8μ broad. In the greater number, the flagellum was close to the body and showed few undulations.

The author believes the crithidia and trypanosomes to belong to the evolutionary cycle of some vertebrate trypanosome. He has found them in one Culex only, though a very large number of mosquitoes from the same neighbourhood have been examined. The supposed vertebrate host is unknown. Attempts at infecting mosquitoes with *Trypanosoma annamense*, the causal agent of the "surra" of Indo-China, have all failed. The most plausible hypothesis seems to be that a bird trypanosome is connected with these Culicine flagellates. The supposed evolution of the trypanosome in the mosquito is believed to take place only in the saliva.

[The possibility of a mixed infection of two distinct flagellates does not appear to have been entirely excluded.]

H. B. F.

PELLAGRA.

Siler (J. F.), Garrison (P. E.) & MacNeal (W. J.). i. **A Consideration of Certain Foods and of Proximity to a Previous Case as Factors in the Etiology of Pellagra.**—*Proc. Soc. Experim. Biol. & Med.* 1914. Feb. Vol. 11. No. 3. p. 94.

ii. **Further Observations of the Thompson-McFadden Pellagra Commission upon the Epidemiology of Pellagra. (Abstract).**—*Proc. New York Pathol. Soc.* 1914. Feb. New Series. Vol. 14. No. 2. pp. 55-56.

A statistical study of the foods used and of the occurrence of pellagra in six villages, among about 5,000 persons, failed to reveal any consistent relationship between the use of any particular food and the occurrence of pellagra. Statistical study showed that the disease spread from an antecedent case as centre. The authors consider their results are only consistent with the view that pellagra is an infectious disease.

H. MacLean.

Martini (E.). **Pellagraforschung in den Vereinigten Staaten und die "*Simulium*"-*Theorie*.** [Researches on Pellagra in the United States and the Simulium Theory.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 178-191. (pp. 334-347). With 7 curves.

The writer holds that the best work on the subject of pellagra is now being carried on in the United States, and suggests that a disease among the Red Indians, described about A.D. 1600, was probably pellagra. He praises the Report of the Thompson-McFadden Commission [see this *Bulletin*, Vol. 3, p. 303].

He emphatically believes that the *Stomoxys calcitrans* must be suspected as an insect carrier rather than any *Simulium*. Of 227 pellagrins, half had been bitten by Stomoxys, hardly a room in the cotton mills was free from this fly and in the mill villages they were present in 97 per cent. of the houses, while in town houses there were only 50 per cent. Moreover, in Barbados, where pellagra is very prevalent, Stomoxys is common, while Simulium could not be found. He is no believer in the maize theory, for he points out that in Spartanburg (N. Carolina) cases continue to occur after the diet of the family has been changed. Partly because pellagra is rare in quarters of the town which are sewered and is common where the houses are provided with unprotected "privies," he agrees with the conclusions of the 1913 Commission that neither maize nor Simulium are the cause of pellagra, but that a more probable cause is either Stomoxys or another fly. "Pellagra is an infectious disease *sui generis*, spread, especially in a household, by contagion or by the excreta of pellagrins."

F. M. Sandwith.

Sambon (L.). **La Pellagre.**—*Bull. Acad. Méd. Paris.* 1914. Séance du 30 Juin. Vol. 71. (3 ser.). No. 26. pp. 897-903.

In this lecture the author runs rapidly over the history of pellagra and states that the disease is not contagious from man to man, but infectious by means of insects. Instead of incriminating only the

Simuliidae, he now includes as possible vectors the "Chironomidae" and the "Ceratopogoninae," flies "whose natural history is still but little known."

He complains that believers in the maize theory will state that pellagra discovered in the British Isles cannot be true pellagra because maize is not eaten there. [This objection does not seem yet to have been made.] He finds from his own observations that the incubation period may be as short as 15 days or even less. He complains that medical men in France do not seem to be interested in pellagra, though he has recently met with it in the Pyrenees and he believes that it exists in other parts of France.

F. M. S.

Weiss (Ettore). **Die Pellagra in Südtirol und die staatliche Bekämpfungsaktion.** [Pellagra in South Tyrol and the Government Methods of fighting it.]—*Oesterreichische Sanitätswesen.* 1914. May 7. Vol. 26. No. 19. pp. 309-331.

The Inspector of pellagra in Innsbruck gives us a valuable resumé of the elaborate Government methods for trying to prevent it.

He believes that the disease appeared at the same time as it did in Italy and he has found a record of "salt disease" in 1786, by which he thinks pellagra was meant. The Austrian Government in 1815 published popular instructions on the subject, and he claims that in Tyrol the earliest prophylactic and curative measures were introduced. So early as 1833 the Venetian Government issued instructions for pellagrins and for the maize market. In 1898 the pellagra asylum at Rovereto was opened and in 1904 a law was enacted dealing with pellagra, of which the various provisions are quoted.

1. Improvement of food in workmen's eating houses and in schools.
2. Creation of ovens and store houses for drying maize. Unfortunately the peasants preferred to use the ovens for drying their silk cocoons.
3. A system for exchanging good maize for damaged maize was proposed but not universally carried out.
4. Bakeries were found successful in towns. Now maize is not eaten, except in some isolated farms where home-made bread still consists of one third maize and two thirds wheat or rye flour.
5. At the Rovereto Asylum, during the last three years, 149 to 168 pellagrins were admitted annually.
6. Doctors were paid to visit pellagra districts.
7. Popular education was carried out by voluntary workers.
8. A statistical department created in 1904 met with the assertion that pellagra had diminished, but figures showed that it had increased since 1895. A fall then began from 8,053 cases in 1904 to 3,503 in 1912.
9. Among those conspicuous in their anti-pellagra labours were Professor Merks, Dr. von Probizer and Mr. Schindler, a Director, who wrote on maize as a diet.
10. Improvements in agriculture and hygiene.

The author considers that the maize theory holds its own, and finds that pellagra distribution follows bad harvests, while the diminished cases, quantitatively and qualitatively, coincide with the improved food supply and a cessation of exclusive maize diet. The peasant still eats *polenta* two or three times a day, but it is now yellow and no longer grayish-white, and he has additional food. Recent measures include courses of domestic economy for women, and they are encouraged to keep poultry and to use garden produce [see this *Bulletin*, Vol. 3, p. 302.] F. M. S.

Funk (Casimir). **Prophylaxe und Therapie der Pellagra im Lichte der Vitaminlehre.** [Prophylaxis and Therapy of Pellagra in the light of the Vitamine Theory.]—*München. Med. Wochenschr.* 1914. Mar. 31. Vol. 61. No. 13. pp. 698-699.

A plea for the acceptance of the theory that, like beriberi, pellagra is a deficiency disease. In districts where the disease is common the food is deficient in the necessary "vitamine," and in localities where maize forms the staple article of diet the deficiency is directly due to the removal of the exterior of the grain by milling. The part left is deficient in vitamine and so pellagra results. Whole rice, potatoes, fresh fruit and milk are advocated as a preventive and cure for pellagra.

H. M.

Goldberger (Joseph). **The Etiology of Pellagra. The Significance of Certain Epidemiological Observations with Respect thereto.**—*U.S. Public Health Rep.* 1914. June 26. Vol. 29. No. 26. pp. 1683-1686.

The writer draws attention to the well known fact that attendants upon pellagrins do not contract the disease, although many chronic lunatics develop it after confinement in an asylum for ten or more years. He considers that the exemption enjoyed by nurses, attendants and employees is due to their having a more varied diet, even when their rations are supposed to be the same as those of the lunatics.

He is satisfied that the incidence among poor rural inhabitants and the rarity among poor townsfolk is due to the superior diet of the latter. He urges that the dietary of those among whom pellagra is most prevalent should be improved and that in the Southern States, fresh meat, eggs and milk should be substituted for "cereals, vegetables and canned foods, that enter to so large an extent into the dietary."

F. M. S.

Siler (J. F.), Garrison (P. E.) & MacNeal (W. J.). **The Relation of Methods of Disposal of Sewage to the Spread of Pellagra.**—*Proc. Soc. Experim. Biol. & Med.* 1914. Feb. Vol. 11. No. 3. pp. 94-95.

The spread of pellagra takes place most readily in communities in which unscreened surface privies are used. Where a water-carriage system of sewage disposal exists, cases of pellagra are rare.

H. M.

Siler (J. F.), Garrison (P. E.) & MacNeal (W. J.). With the collaboration of A. H. Jennings, W. V. King, V. C. Myers, M. S. Fine, O. S. Hillman and Others. **Pellagra. First Progress Report of the Thompson-McFadden Pellagra Commission of the New York Post Graduate Medical School and Hospital.**—iv + 148 pp.

The papers forming this Report have already been reviewed in this *Bulletin*, see Vol. 2, p. 477 and p. 482 ; Vol. 3, p. 303, pp. 309–310.

F. M. S.

Rayer (P.). **Pellagra.** [Translation from Rayer's Atlas of Skin Diseases, 1835.]—*New Orleans Med. & Surg. Jl.* 1914. Apr. Vol. 66. No. 10. pp. 718-730.

Dr. R. Willis's translation ought to be read by all interested in the subject and especially by those who feel impelled to write a paper directly they have met with the disease.

Rayer quotes an author (Aug. Spessa) who wrote that pellagra, when endemic, is only seen among those who inhabit stables and escape from winter cold by passing their spare time in cow houses. This is interesting to those who now consider that the stable fly may be a carrier. Treatment 79 years ago included: "upon the first symptoms of pellagrous affection, the patient ought to change his habits and occupation, or at least abstract himself from the influence of the causes which appear to have occasioned it."

F. M. S.

Swift (E. W. D.) & Brown (H. Egerton). **Some Cases of Pellagra occurring among the Insane in South Africa.**—*Med. Jl. of S. Africa.* 1914. Mar. Vol. 9. No. 8. pp. 174-176. With 2 figs.

The authors state that Dr. M. M. MacFarlane attended five cases of pellagra among Basutos in 1906–07 and ascribes the cause to the maize being reaped that year in very rainy weather, and having been stored in a damp condition. Instead of appearing in the spring and summer it is said to occur in South Africa in the late autumn and winter. Two cases are reported of a Basuto and a Zulu, both males; in the former it was the fourth attack, while in the latter it was the second. During the last eight years six cases presenting pellagrous symptoms have been observed among the native patients in the Bloemfontein Asylum. The typical pellagrous eruption, with subsidence and subsequent recurrence of the rash, has usually been accompanied by diarrhoea and progressive debility of mind and body. [The reviewer saw two cases of pellagra among the lunatics on Robben Island in 1900.]

F. M. S.

Dyer (Isadore). **Changing Views on Pellagra.**—*Jl. Cutaneous Diseases including Syphilis.* 1914. Feb. Vol. 32. No. 2. [Whole No. 377]. pp. 111-112.

This is a brief editorial calling attention to the most common theories of causation. The writer believes that "the dermatologist especially has the opportunity to bring about some of the evolution of ideas in the disease." [It is necessary sometimes to remember that pellagra is no more a skin disease than are syphilis, tuberculosis and leprosy.]

F. M. S.

Harring (E. R.). **Pellagra.**—*New Orleans Med. & Surg. Jl.* 1914. Mar. Vol. 66. No. 9. pp. 673-677.

This is a short record of the first case which the author met with in Louisiana. Since then 14 other cases have been reported within a radius of four miles.

F. M. S.

Evans (J. E.). **Some Observations on Pellagra.**—*Southern Med. Jl.* 1914. June. Vol. 7. No. 6. pp. 483-485.

The author states on very insecure evidence that "pellagra is an infectious spirochetosis, closely allied to syphilis, but in all probability of very much longer period of incubation, extending perhaps, over many months."

F. M. S.

Perez (George V.). **Pellagra.** [Correspondence.]—*Brit. Med. Jl.* 1914. Mar. 14. p. 624.

Pellagra is unknown in the Canary Islands where the staple food is "Gofio," prepared from oats by roasting the grain, grinding and then mixing into a paste with water. To-day a mixture of equal parts of wheat and maize is first roasted and then ground. The author attributes the freedom from pellagra in these islands to the roasting of the grain by which process, he assumes, the injurious element is destroyed.

H. M.

Weston (William). **Pellagra in Early Childhood.**—*Amer. Jl. of Diseases of Children.* 1914. Feb. Vol. 7. No. 2. pp. 124-139. With 5 figs.

The author has examined the leading works on diseases of children published in the United States and Great Britain without finding any mention of pellagra. With regard to Italy he says "we are aware there are hundreds of cases of pellagra in infants." He does not state whence he derives this information, but he says "nearly all the Italian pellagrologists who mention children call attention to the fact that infants born of pellagrous mothers are under weight and that a large percentage of them die before reaching the fifteenth month; among the more common causes of death are gastro-enteritis, bronchitis, broncho-pneumonia and eclampsia. Despite this apparently unfavourable outlook, there are authorities who state that if the baby is early changed to the breast of a strong, healthy wet-nurse and removed from the endemic area, the child will not only escape the disease but will grow and develop normally." After communication with "about 100 physicians" acquainted with pellagra, the author considers there have probably been 15 cases in children under four years of age, in the township of Columbia, which has a population of 65,000. The youngest case from this town was five and a half months old. He says a great many cases were reported between 4 and 10 years of age. "One orphanage reported 57 cases of pellagra out of a total population of 215, the average age being 10, the youngest 5 years. In a small area . . . . 11 cases have occurred, ranging in age from 15 months to 6 years." Incomplete notes or photographs are provided of five cases occurring between the ages of five and a half months and four and a-half years, and most of the children seem to have been breast-fed by their mothers, at least one of whom was pellagrous.

Under the heading of treatment the author recommends "that nurslings, either with or without the suspicion of having pellagra, should usually be weaned from pellagrous mothers. Not only should

a change of diet be ordered for such infants, but in view of our uncertainty as to the real cause of the malady, a change of environment should be ordered or, if this is not possible, patients should be placed in the best hygienic surroundings." [Breast-fed infants contracting pellagra and dying of "marasmus," unless the diet is changed, will remind the reader forcibly of a possibly analogous case, the "infantile beriberi" of the Philippines.]

F. M. S.

Frazer (Thompson). **The Tongue and Upper Alimentary Tract in Pellagra.**—*Jl. Amer. Med. Assoc.* 1914. Apr. 11. Vol. 62. No. 15. pp. 1151-1153. With 2 text figs.

The author considers that dermatitis should be regarded as one of the least important symptoms of pellagra for the purposes of diagnosis. Cases of diarrhoea occurring as part of the spring or summer attack should be regarded with suspicion. Other symptoms of importance are those of the upper part of the digestive system, loss of appetite, dyspepsia, pyrosis and sore mouth, which frequently persist during the cold months. Stomatitis lasting over two weeks occurring in spring or summer is commonly encountered. The lips are dry, the mucous membrane is unduly red, aphthae occur on the gums, which are tender. The "stippled" tongue shows papillae at the tip and anterior portion; the tongue is also characterised by shedding of epithelium and may be completely stripped. Fissuring of the tongue is a marked symptom and if it is associated with enlargement, tremulousness and partial or complete epithelial denudation, pellagra may be suspected.

H. M.

Frazer (Thompson). i. **The First Symptom in Pellagra.**—*Southern Med. Jl.* 1914. July. Vol. 7. No. 7. pp. 532-534.

ii. **Report of a Case of Pellagra with Late Skin Lesions.**—*Jl. Amer. Med. Assoc.* 1914. June 20. Vol. 62. No. 25. p. 1964.

These are superficially written papers, pointing out that it is not always the skin lesions which are the first symptoms. In the case reported a woman had been ill for seven months before the disease was suspected.

F. M. S.

Harris (Seale). **The Digestive Symptoms of Pellagra.**—*Southern Med. Jl.* 1914. July. Vol. 7. No. 7. pp. 525-530.

The author has come to the conclusion that many early cases of pellagra can be diagnosed by digestive symptoms, and that change of diet and improvement of home hygiene are valuable preventives. He tells a tragic story of a bank cashier who for four years had suffered from mild diarrhoea, sore mouth and burning pain in the epigastrium. In June, 1910 he was exposed, while driving, to the sun for many hours and then developed for the first time a typical eruption. He was placed in a darkened room for four weeks, his skin lesions vanished, but on return home he had to drive six miles in the heat of the day. His symptoms all returned with increased melancholia and he committed suicide by cutting his throat with a penknife.

The author finds, after the Ewald test breakfast, that three fourths of his patients show a deficiency or absence of free hydrochloric acid. The treatment he recommends is rest in bed for four weeks or several months in a darkened but well-ventilated room, nitrogenous food, bismuth, salol and dilute hydrochloric acid with pepsin.

[This is a more practical paper than most which have to be read on the subject.]

F. M. S.

Hatiegan (Julius) & Doeri (Adalbert). **Beiträge zur Symptomatologie der Pellagra.** [The Symptoms of Pellagra.]—*Wien. Klin. Wochenschr.* 1914. Apr. 16. Vol. 27. No. 16. pp. 464-467.

The authors consider that altered stomach functions play a large part in the etiology of the disease. From a careful study of ten cases in Hungary, most of which suffered from diarrhoea, and by examining stomach contents and faeces, they found a diminution of pepsin and gastric mucus, with a slightly increased mobility of the stomach. Their conclusions are :—

1. Achlorhydria or hypochlorhydria of the stomach is an early and constant symptom.

2. The function of the pancreas is apparently unaltered.

3. Substitution by drugs of the missing enzymes of the stomach is justified at every stage of the treatment.

F. M. S.

Stewart (Charles E.). **The Probable Identity of Pellagra and Sprue.** *Trans. xvii Intern. Congress of Med.* London. 1913. Sect. xxi. Trop. Med. & Hyg. Pt. 2. pp. 125-133.

The writer believes that " we are not justified in considering sprue and pellagra as two distinct and separate diseases." But he frankly states that he has only had the opportunity of studying two cases of the former and three of the latter disease, apparently in Michigan. Many beginners before him have been struck with the similarity of the " bald tongue " in certain cases of both diseases, but the great difference of other symptoms has prevented them from writing on the subject. There are many cases of pellagra which show no skin lesions, but it is obvious that if the physician trusts only to these, he is rendered incapable of diagnosing pellagra during the many months of the year when they are not very obvious. Though both diseases are usually gastro-intestinal, the bulky, pale, fermenting stools of sprue are not seen in pellagra, unless the individual is suffering from both the diseases. Pellagra is also a cerebrospinal disease, while chronic sprue patients only show signs of mental irritability and obstinacy. The pathological lesions are quite different. The points of resemblance, some of which are mentioned by the author, are unknown etiology, alternating periods of exacerbation and comparative quiescence, dyspepsia, emaciation, tendency to relapse and indicanuria.

F. M. S.

Allison (Wilmer L.). **Report of Cases of Pellagra.**—*Texas State Jl. of Med.* 1914. July. Vol. 10. No. 3. pp. 123-125.

"This paper is simply the report of six cases of pellagra that recovered." They were apparently all treated in a "Sanitarium" and were thus removed from their home surroundings and home diet. All were given sodium cacodylate hypodermically in doses of 3 to 5 grains daily "for weeks and even months." The author claims to cure diarrhoea by giving dilute hydrochloric acid with the meals and finds that this acid is usually absent in pellagrous stomachs. He prefers a diet of milk, eggs and fruit to meat, and he insists upon the importance of keeping patients in bed, even for months. One demented patient, who had to be artificially fed for several weeks, had, upon recovery, no recollection of anything that had happened during two and a half years. Yet during this interval one of her children was born and her husband, a farmer, had twice moved his home.

F. M. S.

Sylvester (R. E.). **Pellagra.**—*Southern Med. Jl.* 1914. June. Vol. 7. No. 6. pp. 449-450.

The author states that he himself "has passed through the horrors of this deplorable disease." He recommends as treatment: absolute rest in a cool, dark room; a firm, kind nurse; a diet of juices made from apples, pine-apples, oranges and lemons, followed by buttermilk and eggs; daily colonic irrigation with two quarts of normal saline solution; cacodylate of soda in gradually increasing doses. In this way he has treated 35 bad cases in less than a year.

F. M. S.

Dyer (Isadore). **The Treatment of Pellagra.**—*Texas State Jl. of Med.* 1914. July. Vol. 10. No. 3. pp. 117-123.

This dermatologist wishes to give the disease an alternative title—*Erythema toxicum epidemicum recurrens*. He mentions the various drugs which have been recommended by authors, mostly arsenical preparations. His own experience after treating nearly 100 cases during the last seven years is strongly in favour of "hydrobromate of quinin." To mild cases he gives from 2 to 5 grains thrice daily, while to severe cases he gives 10 grains every three hours, night and day for 4 or 5 days. He claims never to have lost a case and finds that large doses of quinine control the diarrhoea. He also finds useful calcium salts and gelatine. His general treatment is not new, except that he insists on the patient's being kept out of bed by day, and taking his exercise early in the morning or after sunset.

F. M. S.

Elebash (Clarence C.). **Treating the Gastro-Intestinal Tract in Pellagra.**—*Southern Med. Jl.* 1914. June. Vol. 7. No. 6. pp. 447-449.

This author believes that pellagra is a form of intestinal toxaemia and that it should be treated with "an abundance of green vegetables and fruit juices."

F. M. S.

Willcocks (R. W.). **The Occurrence of Pellagra in England.**—*Practitioner.* 1914. July. Vol. 93. No. 1. (No. 553). pp. 106-112.

The author considers it of the utmost importance that English practitioners should become acquainted with the symptoms of pellagra. His own experience of the disease seems to be limited to one case, of which he furnishes notes. A girl of 14 years, who had never been away from London and its neighbourhood, was under treatment at Guy's Hospital and the Royal Waterloo Hospital, where a diagnosis of (?) cerebral tumour complicated by an acute lung inflammation was made. In July 1913, the patient developed skin lesions which sound like pellagra, and in September she was discharged. Among other non-pellagrous symptoms "there was double optic neuritis and commencing atrophy of the left eye." F. M. S.

Ross (D. Maxwell). **Notes on a Case of Pellagra.** *Review of Neurology & Psychiatry.* 1914. June. Vol. 12. No. 6. pp. 244-249.

This is a doubtful case of pellagra which died in the Royal Edinburgh Mental Hospital. There was an autopsy, but "unfortunately the cord was not removed." The author suggests that some recent cases may be due to modern open-air treatment, combined with the asylum diet, which consists much more of rice and other cereals than the patients are accustomed to eat at home. F. M. S.

Rainsford (F. E.). **On a Case of "Pellagra" in an Insane Patient.** *Jl. Mental Science.* 1914. Jan. Vol. 60. No. 248. pp. 98-100.

The medical superintendent of the Stewart Institution claims to have had under his care the first pellagra case recorded in Ireland. A woman, at the age of 69, broke down mentally, and was sent to his asylum eleven months later. On July 9th, 1913, among other delusions she thought "that the Germans had landed, and that waggons of ammunition and cannons had gone along the road." A month later a rash resembling "an acute sunburn" appeared in the middle of the forehead, then the backs of the hands and wrists became acutely inflamed, red and swollen, then vomiting and diarrhoea occurred for four days. The knee jerks were absent, the patient was diagnosed by three physicians as pellagrous and she died on September 11th. [There is no record of an autopsy. It is difficult to know from the very brief notes whether this was a case of pellagra or not.]

F. M. S.

Spurgin (W. H.). **Acute Pellagra or Pityriasis rubra vel Dermatitis exfoliativa.**—*Guy's Hospital Gaz.* 1913. Nov. 8. Vol. 27. pp. 443-446, and 1914. Jan. 31. Vol. 28. pp. 43-44.

A previously healthy clerk, aged 21, suffered from continued fever, and a diffuse general rash, at first papular, then vesicular and pustular, with profuse desquamation, "handfuls in the bed and on floor." The urine contained *B. coli* and "*B. staphylococcus aureus* yeasts." Six weeks after the onset of the illness, there was a discharge of stinking pus through openings in the skin, chiefly in the armpits and legs. The patient continued to desquamate from September to January, and was then able to walk about. [There is no reason for disagreeing with the skin specialist who saw the case on September 25th and decided that it was *not* pellagra.] F. M. S.

Cesa-Bianchi (D.). i. **Osservazioni cliniche e Ricerche sperimentali sulla Pellagra.**—*Clinica Medica Italiana.* 1914. Jan. Vol. 53. No. 1. pp. 35-58. With 12 figs. and Feb. No. 2. pp. 69-97.

ii. **Sulla Presunta Reazione di Ipersensibilita dei Pellagrosi.**—*Pathologica.* 1914. May 1. Vol. 6. No. 132. pp. 236-239.

These are detailed papers in connection with Volpino's belief that a reaction of hypersensibility can be produced by the injection of a watery extract of bad maize [see this *Bulletin*, Vol. 1, p. 694.] Detailed and tabulated notes are given of 17 pellagrins, mostly from highly pellagrous families, who were subcutaneously injected with one, two or three doses each varying from one to two cc. of an aqueous extract of bad (and sometimes good) maize. Sixteen individuals showed a positive general reaction, such as slight rise of temperature, headache or diarrhoea, while the seventeenth person exhibited a slight local reaction, a blush and tenderness at the site of injection. There were also similarly injected 33 medical in-patients who were not pellagrous, with this result: 13 positive, 2 doubtful, and 20 negative reactions. Intraperitoneal injections of pellagrous blood serum gave mostly negative results, instead of the positive results claimed by Volpino and some other Italians. The author concludes that his research has not been able to prove a definite relation between maize and pellagra. No result was obtained when trying to discover in the blood serum of pellagrins the presence of specific antibodies such as haemolysins, precipitins and substances capable of fixing the complement.

F. M. S.

Nitzesco (J. J.). **Les Ferments zéinolytiques dans le Sang des Pellagreux.**—*Compt. Rend. Soc. Biol.* 1914. May 22. Vol. 76. No. 17. pp. 829-831.

Maize eaten soon after it is gathered is much less well assimilated and digested than when kept for two or three years, and animals fed with the recently gathered maize do not live as long as the others. Horbaczewski attributes this toxicity to the oil and colouring substance of maize. If the protein of maize produces an intoxication, defensive ferments against zein may be expected in the blood of pellagrins. The blood of 48 pellagrins was examined by Abderhalden's dialysis method; the zein was extracted by alcohol from maize by Osborne's method. The reaction with ninhydrin was positive in all cases except those which were chronic and more than two years in hospitals. In these patients the only symptoms present are those of mental confusion. The controls on non-pellagrous peasants fed on maize were negative. With haricot flour, the reaction was negative in 14 pellagrins examined; with gliadin, 10 cases were negative, 4 uncertain.

The author concludes that specific zeinolytic ferments exist in the blood of pellagrins; that the production of these ferments is to be attributed to the penetration of zein from the intestine into the blood and that the ferments persist for a long time in the blood of pellagrins.

H. M.

Tizzoni (Guido) & de Angelis (Giovanni). i. **Hauptcharaktere des Streptobacillus pellagrae als Anleitung zu seiner Identifizierung.** [Principal Characteristics of the Strepto-bacillus of Pellagra as a Guide to its Identification.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. June 13. Vol. 74. No. 3/4. pp. 219-224.

ii. **Caratteri principali della Streptobacillus Pellagrae da servire di Guida per la Sua Identificazione**—*Malaria e Malat. d. Paesi Caldi.* 1914. Mar.-Apr. Vol. 5. No. 2. pp. 85-90.

These papers are identical and continue the authors' investigations already reviewed in this *Bulletin*, Vol. 1, p. 681 and Vol. 2, p. 486. Bacteriological details are given by which Type A can be distinguished from Type B and both can be differentiated from the ordinary strepto-bacilli of man and horse. The authors now wish to draw attention to the fact that they were able to study the transition phases of Type A cultures passing into Type B. It appears that cultures certified as Type A, obtained from a pellagrin in July, and passed four or five times through defibrinated rabbit blood, developed in November and December into Type B. The hypothesis is strengthened that Type B is only a feeble Type A. Type A has been found in both blood and faeces of pellagrins.

F. M. S.

Dearman (W. A.). **Some Views on the Etiology of Pellagra, based upon the Experimental Inoculation of Monkeys and Rabbits.**—*Southern Med. Jl.* 1914. July 1. Vol. 7. No. 7. pp. 519-525. With 8 text figs.

This paper is in continuation of a preliminary note (see this *Bulletin*, Vol. 2, p. 495). It appears that a monkey was given to swallow " a large piece of pseudo-membranous deposit, incorporated with saliva from a typical case of pellagra." After 37 days the monkey showed gradually these symptoms: anorexia, loss of spirits, emaciation, prostration, dysenteric diarrhoea, desquamation and exfoliation of the dorsum of hands and forearms." Also " the tail at the root was markedly erythematous and in a state of desquamation." Nineteen days after the onset of the symptoms death occurred. At the autopsy 12 hours later " the spleen was quite pale and indurated and showed signs of atrophy," the mesenteric vessels were engorged, " the intestinal tract showed signs of congestion and superficial necrosis." As might be expected in an experiment of this kind " a bacterium, closely allied to members of the colon group," was isolated, but the author could not succeed in producing the disease in other monkeys by injecting broth cultures intravenously, subcutaneously, intraperitoneally and intracranially. He then injected two rabbits with blood from pellagrous patients, and symptoms appeared nine days, and 23 days later " erythema, desquamation, exfoliation and pigmentation." He next experimented on a chicken which he caused to be bitten by 50 bed bugs " from a bed which a pellagrin had occupied for six months." After " about three weeks " the bugs died, while the chicken at the end of four months showed no lesions. Experiments were also made without success on rabbits, a monkey, chicken and mice with dog fleas, taken from " mangy dogs " owned by pellagrins.

F. M. S.

Bardin (James). **Note on the Differential Blood Counts in Three Cases of Pellagra.**—*Old Dominion Jl. of Med. & Surgery.* 1913. July. Vol. 17. No. 1. 3 pp.

The author took the opportunity of examining the blood of three negresses in Virginia in July, when they showed marked skin lesions and seborrhoea on face and had severe diarrhoea, and again in November of the same year, when these symptoms were absent. His summary is as follows :—

" 1. In the active stages of the disease there is a constant increase in the lymphocytes, large and small ; this increase is generally at the expense of the polymorphonuclear neutrophiles.

" 2. In the cases under review, there is a persistence of approximately the same blood-picture as in the active stages, after the other symptoms have practically disappeared.

" 3. The persistence of the relative lymphocytosis probably has a prognostic significance, as indicating a probable recurrence of active symptoms with the return of the warm weather."

F. M. S.

MALARIA.

LALOR (N. P. O'Gorman). **Investigation of Malaria in the District of Katha.**—iii + 18 pp. With 2 maps, 2 coloured plates and a chart. 1913. Sept. Rangoon: Office of the Superintendent, Government Printing, Burma.

The localities in which malaria prevails in the province of Burma are divisible into three types:—(1) Low-lying marshy areas in the sea littoral; (2) Areas in the submontane jungles plentifully watered by perennial streams; (3) Low-lying swamps near the banks of large rivers.

The only feature common to all three is the presence of much rank and decaying vegetation in the water.

The town of Wuntho with its neighbourhood, the subject of this report, was selected as a type of the second class of locality. Malaria is very rife indeed; the percentage spleen rate in sixteen villages varied from 15·28 to 85. The district is large, hilly and sparsely populated, and lies for the most part on the west bank of the Irawaddy. There is no time of the year when the irrigation cuts or the pools they give rise to are not full of stagnating water, thereby affording exceptional facilities for the breeding of anophelines. Paddy cultivation *per se* appears to play a minor part in maintaining a water-logged condition of the soil.

In Wuntho itself some remarkable figures were obtained; for instance, the spleen rate for infants of 4 years of age is over 90, and at its lowest—in children of 5 years of age—does not fall below 60. This can only mean that in certain years the malaria is so intense that all the children become infected. In 1913 the fever season in Wuntho extended from April to December. In December, 1913, the endemic index of the population was 58 per cent.; the subtertian parasite played by far the greater part. The indigenous anophelines comprise the following species:—

Species.	Breeding Places.
Myzorhynchus barbirostris	Shallow wells and other stagnant water.
Myzomyia culicifacies	Standing water and drains near the railway line.
Myzomyia rossii	Shallow pools.
Myzomyia listoni. (var. *alboapicalis*) ..	Pools in river bed.
Nyssorhynchus fuliginosus	Marshes below railway station.
Neocellia willmori	Larvae not found.
Nyssorhynchus maculipalpis	Clear pools in river bed.
Myzorhynchus nigerrimus	Marshes below railway station.
Christophersia halli	Larvae not found.

Barbirostris is by far the most numerous species; *listoni* is prevalent from late October to the end of May, *culicifacies* from late in February till June, *barbirostris* and *fuliginosus* from October to December and *rossii* in May. Of these *listoni* (var. *alboapicalis*) alone was found to act as a carrier, that is sporozoites were found on dissection in its salivary glands.

An attempt was made to ascertain the percentage of malaria-carrying mosquitoes infected by the midge *Ceratopogon ferox*, as well as by an acarine mite, and to determine the influence exercised by each of these parasites upon the malaria-bearing capacity of the anophelines

concerned. The Ceratopogon was present in Wuntho during the late October rains but was in no instance observed infecting the local species of anophelines. The acarine mite infested *Myz. barbirostris* and *N. fuliginosus*; as many as 25 specimens were found on a single specimen of *barbirostris*.

The usual preventive measures are recommended, though the author appears to ignore the ways and means by which any extensive measures may be instituted in such a primitive township as Wuntho seems to be.

P. H. Bahr.

Sergent (Edm.) & Foley (H.). **Exploration scientifique du Sahara Constantinois, Oued Rir'—Oued Souf (Avril 1912).**—*Bull. Soc. Path. Exot.* 1914. May. Vol. 7. No. 5. pp. 416-429. With 2 plates and 2 figs.

The districts named are quite dissimilar. Oued Rir' forms a basin 150 kilometers long, lying between Biskra and Touggourt. The altitude is very slight, some of the area being below the level of the sea. There are a large number of artesian wells from which water is conveyed to palm trees. In the neighbourhood of the oasis there are vast marshes; the soil is strongly impregnated with salt. One hundred kilometers to the east lies Oued Souf. This is an uninterrupted sea of high sand dunes. The inhabitants make great crater-like excavations, like the pits of ant-lions, going down as much as 12 metres, and put their palms in the bottom in the damp soil. Thus in Oued Rir' there is stagnant water everywhere, whilst in Oued Souf the water never comes to the surface.

The authors have made a comparative study of malaria in these two regions. In Oued Rir' the observations were made just before the annual epidemic. Many larvae and adults of the anopheline *Pyretophorus chaudoyei* Theobald, were found; this mosquito can live in water containing a considerable amount of salt. The endemic index was studied by palpation of spleens and search for haematozoa, a blood smear being taken from each person examined. The proportion of hypertrophied spleens was higher than that of persons with parasites, which the authors say is the reverse of what one finds in the blacks in tropical regions; the population is negroid. The results are shown in tables. Of 900 natives examined 37, or 4·03 per cent. showed parasites and 84, or 9·15 per cent. had large spleens.

In Oued Souf no anophelines were found, and out of 240 persons examined only one was infected and had a large spleen; he had probably been infected in the course of a journey.

The rest of the paper deals with ophthalmia and tuberculosis.

A. G. B.

Leger (Marcel) & Arlo (J.). **La deuxième Campagne antipaludique en Corse (1913).**—*Le Paludisme en Corse.* pp. 1-43. (Publication de l'Institut Pasteur. 1914. Laval: L. Barnéoud & Cie.

This report embraces a well-written account of malaria in Corsica, the special means adopted to eradicate the disease, and the outstanding topographical features of the malaria infested districts [see this *Bulletin*, Vol. 2, p. 215].

It is difficult from the small number of inhabitants examined in each locality to gauge the intensity of the infection, but in a series of 494 infants on the west coast the spleen rate was found to be 24·69 and the parasite rate 71 per cent. So intensely malarial are some of the villages on the east coast that during the fever season, that is from July to October, the inhabitants emigrate *en bloc* for the hills, deserting their homes and leaving behind only the very infirm and poor.

The subtertian parasite appears to be widely distributed in the island and to account for the majority of the infections. The results of quinine prophylaxis have so far been encouraging, especially amongst the gendarmerie. Mosquito nets being unknown in Corsica, the authors suggest that the Government undertake their free distribution to all officials.

Larvicidal measures have been adopted in a few localities; the authors consider that the success so far achieved warrants their continuation on a more extensive scale in face of the inborn apathy of the Corsicans to sanitary matters.

At Casabianda various engineering measures are in contemplation in order to dispose of the excess of drinking water the town enjoys; this waste water has provided numerous breeding places for anophelines. The encouragement of bats, as advocated by the authorities at Panama, is also under contemplation. During the summer of 1913 large shelters were constructed at Casabianda for this purpose. The results of the campaign are seen at a glance in the accompanying table.

The endemic index before and after quinine prophylaxis.

Locality.	Parasite Index.		Splenic Index.	
	Before.	*After.*	*Before.*	*After.*
Biguglia ..	20	0	30	16·6
Lago .. .	8	0	16	3·7
Arena ..	20	0	40	20
Casabianda ..	15	0	17·24	12·5
Fort Aleria ..	15	0	50	25
Ghisonaccia ..	31·8	5·55	54.54	16·66

The authors consider it advisable that the people should be taught the essential known facts about malaria by a series of popular lectures. They advise the screening of houses, or at least one room in each house, besides the free distribution of quinine during the fever season.

P. H. B.

Byrd (Hiram). **Mosquitoes. Rôle of Certain Species in Prevention of Malaria.**—*New Orleans Med. & Surg. Jl.* 1914. July. Vol. 67. No. 1. pp. 14-17.

The author has found in Florida that the prevalence of malaria in a given locality bears an inverse ratio to the abundance of salt marsh mosquitoes. The reason for this anomaly appears to be that the inhabitants of these salt marshes screen their houses in order to protect themselves from all kinds of insects.

P. H. B.

Grumann & Bontemps. **Larvierte Form einer Malaria in malariafreier Gegend.** [A Modified Case of Malaria occurring in a Malaria-free District.]—*Deut. Med. Wochenschr.* 1914. May 28. Vol. 40. No. 22. pp. 1113-1114. With 1 fig.

The authors record a quite unsuspected case of tertian malaria in a resident of Altona (Hamburg.) They are quite at a loss to know how the infection was acquired as they have so far failed to find any anophelines in the town. The occurrence of severe facial neuralgic symptoms during the attack imparts to the case a certain amount of clinical interest.

P. H. B.

van Driel (B. M.). **Een Geval van Spastische Spinaalparese bij Malaria tertiana.** [A Case of Spastic Paraplegia in Tertian Malaria.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1914. Vol. 54. Pt. 2. pp. 217-222.

A spastic paralysis with increased reflexes and a positive Babinski sign developed during the course of an attack of benign tertian fever. As the symptoms rapidly disappeared under vigorous quinine treatment, and as no other cause of a latent sclerosis could be discovered, the author is inclined to attribute the onset of the paralysis either to a blockage of the spinal capillaries by the malaria parasite itself or by its pigment—melanin.

P. H. B.

Tresidder (A. G.). **Intramuscular Injections of Quinine.**—*Lancet.* 1914. June 6. pp. 1647-1648.

In this letter Captain Tresidder replies to the remarks made by Sir Ronald Ross regarding the successful treatment of a case of malarial coma by intramuscular injections of quinine (see this *Bulletin*, Vol. 4, p. 92). He points out that Sir David Semple's experiments appear to disprove the statement that quinine is absorbed with very great difficulty from muscle and subcutaneous tissue. Further he cites the results of clinical experience in favour of this method of administration and quotes MacGilchrist to the effect that although quinine, when given by the mouth, is more rapidly absorbed, the curve of absorption is more sustained when the intramuscular method is employed. He states that a "possible explanation of the clinical observation that injections of quinine do good when oral administration fails is that in malaria the co-existing catarrhal condition of the gastro-intestinal tract may considerably inhibit the absorption of quinine." Later on he refers to Sir David Semple's experiments as regards the relation of intramuscular quinine injections to tetanus and records his belief, with which most clinicians in the tropics will certainly agree, that these experiments have never convinced him that quinine injections as used in practice are dangerous, or that their administration requires the simultaneous injection of tetanus antitoxin. He criticises the experiments, laying stress on the magnitude of the doses employed in the case of guinea-pigs, and showing that corresponding doses in the case of human beings would amount to over 100 grains for a man of 11 stone. If, he says, it is true that quinine injections favour the onset

of tetanus by paralysing the phagocytes and by destroying tissue at the site of injection, then the larger the dose of quinine the more favourable would be the conditions for the development of tetanus. In this connection he pertinently remarks that it would be interesting to know what percentage of guinea-pigs, if any, would develop tetanus after the injection of 1–15th grain of quinine, which is the proportionate dose for a guinea-pig of 500 grammes weight, assuming that 10 grains is a suitable dose for a man of 11 stone. He agrees with Sir Patrick Manson that it is not the quinine but faulty technique which is to blame.

In his experience, cases of malaria, even in its pernicious forms, do not, as stated by Ross, generally recover temporarily without any treatment at all. The convulsions which occurred in his case he attributes to the toxins of malaria irritating the cerebral centres, and he concludes his paper by reaffirming his belief in the value of intramuscular injections.

[The question which Captain Tresidder discusses is one of such importance that the reviewer may perhaps be permitted to make some remarks regarding it. There can be no doubt that African practice and, as is evident from a trenchant article in the *China Medical Journal* for July, 1914, Chinese practice is strongly in favour of intramuscular quinine injections. The writer had recently an opportunity of discussing the question with a British physician in Maracaibo, who has had a large experience in the treatment of severe cases coming from the very malarious districts in north-western Venezuela. He pinned his faith to the injection method. Recently a sad case occurred there, for a young American engineer treated by a local native practitioner with intramuscular injections died of tetanus, the direct result of the treatment. Enquiry, however, showed that there had been gross carelessness and no attempt either at sterilisation or common cleanliness. As is well known Ross, Rogers, Thayer, Bates and others are opposed to the injection method, but in the case of the last named the objection is a modified one, as will be apparent if reference be made to the summary of his paper appearing in this *Bulletin*, Vol. 2, p. 554.

There is doubtless something to be said on both sides, though personally the writer is of opinion that Semple has not proved his case, and that, if proper precautions be taken, the risk of tetanus may be ignored, while if a suitable salt be employed in adequate dilution necrosis and abscess formation need not be feared. Theoretically, there is a good deal of evidence pointing to the superiority of the oral method of administration. For a time the writer was an upholder of this method, and he still thinks that in many cases where the stomach tolerates quinine, and more especially when quinine can be given in effervescing mixture, it is best to administer it by the mouth. On the other hand, his own experience, and perhaps to a greater extent that of others, has taught him the value and efficacy of intramuscular injections. They are indicated in all cases of gastric disturbance such as so often occurs in quartan infections, in all cases which, so to speak, "hang fire," and, save when intravenous administration in high dilution is urgently required, in cases where pernicious symptoms have developed, or where pernicious aura is present. In all such cases the writer believes in two, three or more quinine injections, and then, if it can be tolerated, ample and prolonged treatment by the mouth, giving the drug preferably in effervescing form. In two severe quartan attacks, one of which occurred in his own case, the happiest results were obtained, the cure being, so far as can be told, complete, and it must be remembered that quartan malaria is the type specially prone to relapse. In both these cases quinine failed at first when given orally, possibly on account of gastric disturbance. One is inclined to think that the personal equation is not sufficiently considered. Doubtless, muscles differ just as stomachs differ. Some can readily absorb quinine, others cannot. It is possible that the age factor has to be remembered. One has seen intramuscular injection apparently fail in a debilitated subject of nearly 50 years of age.

Again, it is likely that sufficient work has not been carried out as to the most suitable site for injection. We find that most prefer the buttock, but one German physician favours the deltoid. There is research to be done in this direction. After all, however, and with due deference to theories and to experimental work, it is to be remembered that there is a wise old Scottish proverb to the effect that "the proof of the pudding is the preein' o't." There is, undoubtedly, a vast mass of clinical experience to show that intramuscular quinine injections possess the confidence of members of the profession practising in the tropics, and this is true amongst all nations and probably in every country. Captain Tresidder puts the matter in a nutshell when he says. "I think it unlikely that the practitioner in the tropics would give the care and time necessary to their preparation unless he firmly believed that some material advantage was to be gained for his patient, and unless his results from this mode of treatment were clinically more satisfactory than those obtained by the much simpler action of writing a prescription."

In this connection it is perhaps not out of place to direct attention to the treatment of lobar and lobular pneumonia by large intramuscular injections of quinine as carried out by SOLIS-COHEN in the United States. The quinine, given along with cocaine or pituitary extract and in certain cases associated with vaccine therapy, is believed to neutralise the toxins of pneumonia and to prevent cardio-vascular paralysis. It is said to be very successful and even when it fails to effect a cure it adds greatly to the patient's comfort. It certainly does not hurry him to the grave in convulsions or impose upon him weary days of suffering as a result of muscle necrosis or abscess formation*.]

A. Balfour.

GIEMSA (G.) & WERNER (H.). **Erfahrungen mit weiteren dem Chinin nahestehenden Alkaloiden und einigen ihrer Derivate bei Malaria.** (Ausführliche Mitteilung). [Further Experiences with Alkaloids closely related to Quinine and some of its Derivatives in Malaria.] *Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 81-100. [pp. 237-256.] With 25 curves.

In this paper the authors supplement the observations they have already published on the same subject, (see this *Bulletin*, Vol. 3, p. 257).

Chinidin (*Conchinin*) ($C_2O\ H_{24}\ N_2O\ Hcl + H_2O$) was given in doses of ·4 grammes daily to 36 cases of tertian and subtertian malaria, and was found to be as effective as quinine itself.

Hydrochinidin ($C_2O\ H_{26}\ N_2O_2\ Hcl$) was tried in 5 tertian and subtertian infections. The conclusion derived was that the hydrolysis of the alkaloid in no wise increased its antimalarial properties though according to MORGENROTH it increases its trypanocidal properties *in vitro*.

Cinchonin ($C_{19}\ H_{22}\ N_2O\ Hcl + 2H_2O$) and *Hydrochinchonin* ($C_{19}\ H_{24}\ N_2O_2\ Hcl + 2H_2O$) were found to be by no means as effective as quinine and in a similar manner the rare and costly cuprein showed but feeble qualities.

Chinaethylin ($C_2O\ H_{26}\ N_2O_2)_2\ H_2SO_4 + H_2O$) and *Chinopropylin* ($C_{22}\ H_{28}\ N_2O_2)_2H_2SO_4 + 1\frac{1}{2}\ H_2O$) in doses of ·3 to ·4 grammes caused the rapid disappearance of the parasites within a few days.

Apparently the antiparasitic properties of cuprein are increased by the addition of iron hydroxyl groups and reach their maximum in the

* A paper by the author just cited on the intramuscular use of quinine in malaria is just to hand. (*American Journal of Tropical Diseases and Preventive Medicine.* 1914. August. p. 124.)

ethyl group, while in their higher homologues this property again diminishes.

The authors propose to conduct further experiments on these drugs *in vitro*, using for this purpose some easily cultivated protozoon, such as Colpidium. P. H. B.

Mühlens (P.) & Gelhaar (F.). **Ueber Arsalytbehandlung, insbesondere bei Syphilis und Malaria.** [Arsalyt in the Treatment of Syphilis and Malaria.]—*Beihefte z. Arch. f. Schiffs- u. Tropenhyg.* 1914. June. Vol. 18. Beiheft 5. pp. 146-154. [pp. 302-310.]

Arsalyt is a convenient and necessary abbreviation for a synthetic compound known as Bismethylaminotetraaminoarsenobenzol. Although Giemsa has estimated the *dosis tolerata* at 3·6 grammes for a man of about 70 kilogrammes body weight, yet untoward symptoms followed the intravenous injection of ·1 gramme in one case.

In malaria the results of intramuscular injection (·3 gramme) were encouraging; the immediate attack was cut short, but relapses, especially in subtertian infections, were not prevented. It is clear that, as in the case of salvarsan and neosalvarsan, total extermination of the parasites is not to be expected, although these drugs can act as excellent adjuvants, and in every case their exhibition should go hand in hand with that of quinine.

Good results were obtained in tropical ulcer and in syphilis by administering the drug by the intramuscular route. P. H. B.

Fletcher (William). **The Wassermann Reaction in Malaria.**—*Lancet.* 1914. June 13. pp. 1677-1678.

In view of the work of de Haan, who found that the majority of malarial sera were positive to the Wassermann reaction (see this *Bulletin*, Vol. 2, p. 557), and especially after the expressed opinion of Professor Wassermann himself, it was determined to investigate the subject thoroughly at Kuala Lumpur.

The sera of fifty cases of malaria (20 subtertian, 17 simple tertian and 13 quartan) were examined; in every instance parasites were present in the blood at the time of collection. All the subtertian cases gave a negative reaction save three, whose past histories as regards syphilis were doubtful. All the tertian and quartan cases were negative with the exception of two who had previously suffered from syphilis. It was considered that possibly the intensity of the infection might influence the reaction, an idea which a rough count of the parasites present in the red cells in each case did not confirm. In all the foregoing cases the serum was inactivated by being heated for 30 minutes at a temperature of 55° C., and as a number of malarial sera not treated in this manner gave a weak positive reaction, the author is inclined to think that the omission of this precaution may account for the number of positive results obtained by other observers.

The method employed by Fletcher is that of Browning, Cruikshank and McKenzie, the distinguishing feature of which is the use of two antigenic extracts, one of ox-liver lecithin, the other consisting of a mixture of lecithin and cholesterin, and the employment of an anti-ox haemolytic system.

P. H. B.

Lawson (Mary R.). **Free Malarial Parasites and the Effect of the Migration of the Parasites of Tertian Malarial Infections.**—*Jl. Experim. Med.* 1914. June. Vol. 19. No. 6. pp. 523-535. With 6 plates.

This paper, like one by the same author recently summarised (see this *Bulletin*, Vol. 4, p. 85), is illustrated by numerous coloured plates and microphotographs and adduces further evidence of the extra corpuscular habit of the tertian parasite. The author's summary of the results of this investigation is as follows :—

(1) The malarial parasite is extracellular throughout its life cycle and migrates from red corpuscle to red corpuscle destroying each before it abandons it; in the brief intervals between, the parasite is free in the blood serum; it does not remain long free, but almost immediately attaches itself to another red corpuscle by means of delicate pseudopodia.

(4) The malarial parasite can live for some time free in the blood serum, though under normal conditions there is no reason why it should remain free for any length of time, and there are certain periods in the life of the parasite when it must be admitted that it is free from the corpuscle and survives. If the parasite is, as I believe, attached to the external surface of the red corpuscle, it is constantly exposed to the action of the patients' serum.

(5) The destruction of more than one red corpuscle by each parasite would readily account for the severe and early anaemia occurring in malarial infections.

P. H. B.

Martini (Erich). **Ueber die Entwickelung von Malariaparasiten im Basschen Nährboden.** [On the Development of Malaria Parasites on Bass's Medium.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1914. June 13. Vol. 74. No. 3/4. pp. 250-254. With 2 coloured plates and 1 text fig.

The author has, after many unsuccessful attempts, succeeded in cultivating the asexual cycle of the subtertian parasite after Bass's method.

The paper is illustrated by some very brilliant colour-microphotographs by Professor von Wasielewski.

P. H. B.

BLACKWATER FEVER.

PLEHN (Albert). **Ein Beitrag zur Kenntnis der akut hämolytischen Malaria. (Schwarzwasserfieber).** [A Contribution to the Knowledge of Acute Haemolytic Malaria (Blackwater Fever).] *Deut. Med. Wochenschr.* 1914. July 9. Vol. 40. No. 28. pp. 1414-1416.

Blackwater fever cases can be grouped according to several types which can be recognized after long experience and of which the prognosis differs considerably.

(1) Generally the haemolytic attack is ushered in by a rigor followed by high fever. The urine passed immediately after is bloodstained; in a short time a distinct icterus develops, which reaches its maximum intensity on the third day. At the end of the second, generally at the end of the third day, the fever falls to normal; the urine soon becomes normal in colour till the last traces of albumen disappear one to two days later; at this stage the patient begins to feel better. Anuria occurring at the third day is the complication which is most to be feared in this form.

(2) The cases which suffer from intermittent attacks of haemoglobinuria and rigors have a less favourable prognosis. Icterus in such cases is generally very slight and anuria a very infrequent complication. The anaemia is, however, progressive, death taking place on the fourth or fifth day.

It is a remarkable point that Plehn should have seen more cases of this kind since he has been in Berlin than he ever encountered in Kamerun, and that the death-rate from this form is considerably higher in that city than in the tropics.

The clinical history of one such case is given in detail. In the acute haemolytic stage abnormal cells, such as gigantoblasts, appear in the blood, but it is worthy of note that nucleated red cells or normoblasts are not a feature of convalescence at a stage when blood regeneration is active.

In the treatment of these cases Plehn is not in favour of the intravenous injection of physiological saline or of Ringer's solution on too liberal a scale.

(3) *The fulminating-toxic type.* The icterus is very slight, but anuria, coma and death follow within twenty-four hours. In a series of over 170 cases two of this kind have come under the author's notice.

(4) *A haemorrhagic type* with extravasations of blood from stomach and intestines is recognized, but according to the author's experience is certainly not common.

(5) *The abortive ambulant type* is one in which haemoglobin appears in the urine after a small prophylactic dose of quinine, and the true clinical picture of blackwater fever can be further complicated by the supervention of parenchymatous nephritis or obstruction of the common bile ducts; both complications however are rare.

P. H. B.

Lalor (N. P O'Gorman). **Investigation of Malaria in the District of Katha.**—iii + 18 pp. With 2 maps, 2 coloured plates and a chart. 1913. Sept. Rangoon: Office of the Superintendent, Government Printing, Burma.

Blackwater Fever. In the course of a systematic blood examination of Burmese children, Lalor encountered in the nucleus of the mononuclear cells certain accretions of chromatic material; these he considers are parasitic in nature, though his reasons for doing so appear hardly adequate.

The spores losing their envelopes enter, or are taken up by the mononuclear cells and develop into rosettes. The cytoplasm of the spore is blue with bluish stippling and contains a round mass of chromatin and a vacuole. Associated with them are malarial plasmodia of great malignancy.

Lalor wishes to connect his newly discovered bodies with the presence of blackwater fever, which is endemic in that part of Burma. A poorly-executed coloured plate accompanies the report and purports to portray these bodies and their associated malaria parasites as they appear in a blood film. (See also this *Bulletin* Vol. 2, p. 317.)

P. H. B.

David. **Sur l'Etiologie et la Prophylaxie de la Fièvre bilieuse hémoglobinurique.**—*Bull. Soc. Path. Exot.* 1914. June. Vol. 7. No. 6. pp. 509-512.

The author, who has practised for several years in a country where blackwater fever is common (Palestine), considers that three conditions are necessary before an attack can develop.

(1) The patient must be an old malarial subject; (2) He must have been treated with considerable doses of quinine; (3) He must have omitted to take his habitual dose of quinine some time before the dose which determined the attack of blackwater fever.

As to the exact nature by which quinine determines the onset of haemoglobinuria the author is uncertain, but he thinks it is possibly an anaphylactic effect.

P. H. B.

Yofé (Hillel). **A propos de la Fièvre hémoglobinurique en Palestine.** *Bull. Soc. Path. Exot.* 1914. June. Vol. 7. Vo. 6. pp. 512-514.

As one who has practised for 23 years in very malarious districts in Palestine, the author is able to confirm two of the hypotheses put by David in the paper reviewed above; the third hypothesis—namely that haemoglobinuria develops in those who have not taken quinine for some time previously to the dose which determines the attack—he is quite unable to confirm, since he can quote a number of cases in whom haemoglobinuria developed while they were undergoing regular treatment with small doses of quinine. He concludes that a quinine prophylaxis in small daily doses (·25–·4 grammes) during the fever season is the best means of warding off an attack of haemoglobinuria.

P. H. B.

Book Review.

Lambart (H. C.). [M.A., M.D., L.R.C.P. & S. Edin., L.R.F.P. & S. Glas., &c.] **A Practical Handbook of the Tropical Diseases of Asia and Africa.**—xv + 324 pp. With 6 coloured plates and 82 other illustrations. 1914. London: Charles Griffin & Co. [Price 8*s.* 6*d.* net.]

According to the author's statement in the Preface his book embodies the experience gained by residence in various parts of the tropics, and aims at being a concise and practical manual. By arranging the subjects alphabetically he hopes to show, at a glance, the diagnosis and treatment of the principal tropical diseases. All theories are avoided and the work, stripped to essentials, is arranged for readiest reference. Special attention has been paid to treatment and sections are specially devoted to aids to diagnosis, bacteriological methods, special diet, eye diseases, geographical distribution, fevers, and skin diseases.

There are so many good works on tropical medicine that a high standard of accuracy is naturally demanded of a new one. Unfortunately we do not find it in Dr. Lambart's book. Its pages show evidence of haste in compilation and there are many inaccurate statements which render it not only misleading to the layman but most unsuitable for the student and beginner in tropical medicine. For instance, talking of the morbid anatomy of sleeping sickness on page 9, the author states "The brain substance, sometimes firm, at others soft and oedematous, usually congested, with fluid in the ventricles, is increased." What does this mean? Again on page 167, in the part on filariasis under the heading urine, it is stated "Albumin always present . . . . sugar absent. Generally of milky appearance, or pinkish from blood admixture." This of course applies to the urine in chyluria, but this is not stated in the text, and might easily give the impression that it was the normal condition of the urine in filariasis. Further the statement on the same page "the worms are whitish in colour, long and filiform, with a globular head terminating in a circular unarmed, lipless mouth; the tail is rounded (fig. 38)" refers clearly to the adult worms, though the figure represents an embryo. On page 171 "the genus *Stegomyia culex*" is spoken of, on page 219 *Culex stegomyia*. *Amoeba coli* (page 216) is said to be "easily found in the sloughs on the ulcerated surface and also in the mucus thrown off by the inflamed bowel and liver abscess" though a fairly correct account of the entamoebae is given on pages 220 and 240. Kala azar is defined as "a chronic specific febrile disease caused by *Leishmania donovani*, a parasite introduced into the human body by the bite of a *Conorhinus*" (page 143). We are not aware that proof of transmission has been brought in the case of any bug; that suspected is *Cimex*, as is stated on page 67. Misspellings are frequent.

We have drawn attention to these errors—and others might have been cited—because, whatever good points the work possesses, such inaccuracies are inadmissible in a "practical hand-book" of tropical diseases, and obviously make it unfit for general use. The book needs thorough revision before it can be recommended.

Editors.

ERRATA.

Vol. 4. p. 153, pagination of Agramonte's paper should be 77-81.

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